

# NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



## THESIS

**ACOUSTICALLY FORCED HEAT TRANSFER  
FROM A TUBE BANK**

by

Gabriel A. Lowe

June 2000

Thesis Advisor:

Ashok Gopinath

Approved for public release; distribution is unlimited.

Approved for public release; distribution is unlimited.

20000818 066

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.</p>			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED	
	June 2000	Master's Thesis	
4. TITLE AND SUBTITLE: Acoustically Forced Heat Transfer From a Tube Bank		5. FUNDING NUMBERS	
6. AUTHOR(S) Lowe, Gabriel A.			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey CA 93943-5000		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
<p>11. SUPPLEMENTARY NOTES The views expressed here are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.</p>			
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12b. DISTRIBUTION CODE	
<p>13. ABSTRACT (maximum 200 words) Experimental work was carried out on the steady state heat transfer behavior from a tube bank in a zero mean oscillatory flow. The oscillatory flow across the tube bank was created by an acoustic field inside an isolated resonant chamber. The tube bank was represented by smooth walled cylinders placed parallel to each other, with their plane normal to the direction of fluid oscillation, similar to the arrangement found in many heat exchangers. The spacing between the cylinders was varied to examine the effects of boundary layer interference on the heat transfer behavior. Heat transfer correlations were developed in the form of Nusselt number as a function of the streaming Reynolds number for each tube spacing. This experimental study is relevant to the design of heat exchangers for thermoacoustic engines.</p>			
14. SUBJECT TERMS Thermoacoustic Engines, Heat Exchangers, Oscillatory Flows, Heat Transfer, Tube Bank		<p>15. NUMBER OF PAGES 106</p> <p>16. PRICE CODE</p>	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18 298-102



**Approved for public release; distribution is unlimited**

**ACOUSTICALLY FORCED HEAT TRANSFER FROM A TUBE BANK**

Gabriel A Lowe  
Ensign, United States Navy  
B.S., United States Naval Academy, 1999

Submitted in partial fulfillment of the  
requirements for the degree of

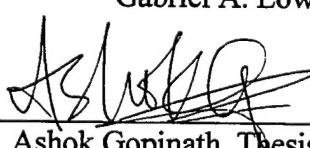
**MASTER OF SCIENCE IN MECHANICAL ENGINEERING**

from the

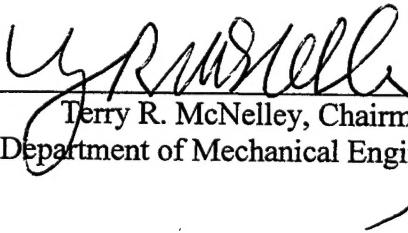
**NAVAL POSTGRADUATE SCHOOL**  
**June 2000**

Author: 

Gabriel A. Lowe

Approved by: 

Ashok Gopinath, Thesis Advisor

  
Terry R. McNelley, Chairman  
Department of Mechanical Engineering



## ABSTRACT

Experimental work was carried out on the steady state heat transfer behavior from a tube bank in a zero mean oscillatory flow. The oscillatory flow across the tube bank was created by an acoustic field inside an isolated resonant chamber. The transverse tube bank arrangement was represented by smooth walled cylinders placed parallel to each other, with the plane of the cylinders normal to the direction of fluid oscillation, similar to the arrangement found in many heat exchangers. The spacing between the cylinders was varied to examine the effects of boundary layer interference on the heat transfer behavior. Heat transfer correlations were developed in the form of Nusselt number as a function of the streaming Reynolds number for each tube spacing. This experimental study is relevant to the design of heat exchangers for thermoacoustic engines.



## TABLE OF CONTENTS

I. INTRODUCTION .....	1
II. BACKGROUND.....	3
A. ACOUSTIC FIELDS .....	3
B. THERMOACOUSTIC REFRIGERATION.....	4
C. BOUNDARY LAYERS .....	6
III. EXPERIMENT .....	9
A. INTENT .....	9
B. DIMENSIONLESS PARAMETERS .....	9
1. Cylinder Length Scale .....	10
2. Amplitude Parameter .....	11
3. Frequency Parameter .....	11
4. Interference Parameter.....	12
5. Streaming Reynolds Number.....	13
C. APPARATUS .....	14
1. Sound Chamber .....	14
2. Tube Bank.....	15
3. Electronic Instruments Package.....	16
D. PROCEDURE.....	19
IV. RESULTS AND DISCUSSION.....	23
V. CONCLUSIONS AND RECOMMENDATIONS .....	31
APPENDIX.....	33
A. SAMPLE CALCULATIONS .....	33
1. Nusselt Number .....	33
2. Streaming Reynolds Number.....	34
B. UNCERTAINTY ANALYSIS .....	35
1. Nusselt Number .....	35
2. Streaming Reynolds Number.....	35
C. EXPERIMENTAL DATA.....	37
LIST OF REFERENCES.....	85
INITIAL DISTRIBUTION LIST .....	87



## LIST OF FIGURES

1. Resonate Standing Acoustic Wave in an Isolated Chamber .....	4
2. Thermoacoustic Refrigerator .....	6
3. Heat Exchanger .....	7
4. Boundary Layers on Cylinders in Cross Flow .....	8
5. Experimental Sound Chamber .....	14
6. Tube Bank .....	15
7. Heater Circuit .....	17
8. Instruments Schematic .....	18
9. Photograph of Experimental Apparatus .....	18
10. Geometry for Maximum Velocity at Tube Bank .....	20
11. Nusselt Number vs. Streaming Reynolds Number for $S_T/d=1.5$ .....	25
12. Nusselt Number vs. Streaming Reynolds Number for $S_T/d=1.75$ .....	26
13. Nusselt Number vs. Streaming Reynolds Number for $S_T/d=2.0$ .....	27
14. Nusselt Number vs. Streaming Reynolds Number for all $\phi>1$ .....	28
15. Nusselt Number vs. Streaming Reynolds Number for $ST/d=1.25$ .....	30



## LIST OF TABLES

1. Resonate Frequencies Used .....	19
2. Parameter Ranges Used .....	23
3. Correlation Data for $\varphi > 1$ .....	25



## LIST OF SYMBOLS

$\chi$	cylinder compactness parameter
$\delta$	boundary layer thickness [m]
$\Delta T$	temperature difference [K]
$\varepsilon$	amplitude parameter
$\gamma$	specific heat ratio
$\phi$	interference parameter
$\lambda$	wavelength [m]
$\lambda_R$	radian wavelength [m]
$\Lambda$	frequency parameter
$\nu$	kinematic viscosity [ $m^2/s$ ]
$\omega$	radian frequency [rad/s]
$\zeta$	surface-to-surface tube bank spacing [m]
$A_H$	heater cross sectional area [ $m^2$ ]
$c$	speed of sound [m/s]
$d$	cylinder diameter [m]
$f$	frequency [Hz]
$G$	amplitude gain
$G_R$	Grashoff number
$h$	convection heat transfer coefficient [ $W/m^2K$ ]
$I_H$	heated cylinder current [A]
$I_R$	resistor current [A]
$k_{air}$	thermal conductivity of air [ $W/mK$ ]
$L$	tube-bank to chamber-end distance [m]
$L_H$	heated cylinder length
$Nu_d$	Nusselt number based on diameter
$P_m$	mean ambient pressure [Pa]
$P_o$	pressure level [Pa]
$Pr$	Prandtl number
$Q_H$	heated cylinder power [W]
$r$	cylinder radius [m]
$R_{air}$	gas constant for air [J/kg K]
$R_R$	resistor resistance [ $\Omega$ ]
$R_S$	Streaming Reynolds number
$S$	transducer sensitivity [mV/psi]
$S_T$	center-to-center tube bank spacing [m]
$T_A$	ambient temperature [K]
$T_{avg}$	average fluid temperature [K]
$T_H$	heated cylinder temperature [K]
$V_H$	heated cylinder voltage [V]
$V_{mic}$	transducer voltage [mV]
$V_R$	resistor voltage [V]

## I. INTRODUCTION

The influence of sound waves in the transfer of heat is a relatively new science. A recent application of acoustic heat transfer is relevant to the design of heat exchangers for thermoacoustic engines/refrigerators. Unlike the vapor cycle refrigerators in widespread use today, thermoacoustic refrigeration does not involve the use of chloroflourocabons (CFCs) that are potentially harmful to the ozone layer in the atmosphere. Additionally, thermoacoustic refrigerators do not contain many moving parts, which can substantially reduce maintenance costs. Thermoacoustic refrigeration uses sound waves to remove heat from the refrigerated space to produce the cooling effect. Unlike uniform flow, however, there is little data available to quantify the heat transfer exchange with bodies in an oscillating flow.

In order to make the commercial use of the thermoacoustic refrigerator an eventual reality, it must be economically competitive with conventional vapor cycles. At present, thermoacoustic refrigeration is less efficient than conventional cooling. Designing effective heat exchangers for use in an acoustic field is a crucial step in making these refrigerators more efficient. To accomplish this, experimental data must be collected to correlate the heat transfer rate from a heat exchanger to the acoustic field characteristics so as to allow a more knowledgeable design.

Wheately et al. (1983) and Atchley et al. (1990) have performed detailed experiments to examine the heating/cooling thermoacoustic effect produced by a standing acoustic wave. Raney et al. (1954), Westervelt (1960), and Nyborg (1965) have developed theory for the behavior of acoustic streaming flow around isolated bodies. Mozurkewich (1995), and Gopinath and Harder (2000), have performed heat transfer

experiments with an isolated cylinder in an oscillating flow. Correlations to relate the dimensionless parameters important to heat transfer, namely the Nusselt Number ( $Nu_d$ ) as a function of the Streaming Reynolds Number ( $R_s$ ) were found by Gopinath and Harder (2000). Common heat exchanger designs, however, usually consist of not a single isolated cylinder, but several tubes arranged in various geometries. One common geometry is a bank of tubes in a transverse arrangement, i.e. placed with its plane normal to the direction of flow – it is this particular geometry which forms the subject of study in this thesis. Depending on the distance between the tubes, the boundary layers formed on the surface of the tubes by the oscillating flow may interfere with each other and have a deleterious affect on the heat transfer rate. It would be beneficial then, to determine the extent of this interference so that heat exchanger design could incorporate this influence.

This experimental work involves the correlation of the Nusselt number to the streaming Reynolds number for a transverse bank of cylindrical tubes subjected to an acoustic field. A high power, standing, resonant wave is generated in an isolated chamber by an acoustic compression driver. The resulting oscillating cross flow is used to remove heat from a heated cylinder with unheated or “dummy” cylinders placed alongside it to simulate the various neighboring tubes as in a heat exchanger bank. The data required to calculate the Nusselt number and streaming Reynolds number are gathered using various electronic instruments. The uniform spacing between the cylinders is parametrically varied so that the resultant effect of the boundary layer interference on the heat transfer can also be determined.

## II. BACKGROUND

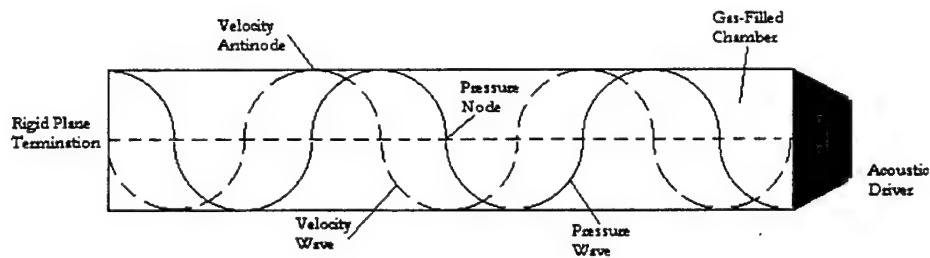
### A. ACOUSTIC FIELDS

Classical fluid dynamics and convective heat transfer studies have for obvious reasons focused most attention on uniform fluid flows, i.e. flows which do not reverse direction, let alone do so in a rapid and repetitive manner as in an acoustic field. The fluid is put into motion by some force, such as a fan, pump, or atmospheric wind. The moving fluid then transfers heat into, or away from, a surface, and is then carried away. A common example is the air flowing through the finned passages of the radiator of an automobile. This situation could be modeled as a uniform flow of cool air at a velocity approximately equal to the speed of the vehicle, flowing across finned tubes carrying hot engine coolant.

Oscillating flow, on the other hand, is a situation in which the fluid flow direction changes continuously back and forth. The fluid velocity has a zero mean since the amplitudes of oscillation in both directions are equal, but their directions are opposite. There is no net movement of the fluid over time. However, there can still be heat transfer in an oscillating flow because convection occurs due to the basic motion of the fluid, regardless of the fluid direction. Heat transfer from an oscillating flow has been studied more and more frequently in the latter half of the twentieth century, as reviewed for instance by Richardson (1967).

In an acoustic sound field, an acoustic driver vibrates and causes the fluid oscillation. If a resonant field is isolated inside a chamber, such as a plane-ended cylinder, the field will have a standing wave distribution, i.e. sinusoidally varying

pressure and velocity distributions that are 90 degrees out of phase with each other. A pressure antinode, or maximum, is created at the planar rigid end termination of the chamber where the velocity is zero from the no-slip boundary condition. This situation is illustrated in Figure 1. Since the pressure and velocity fields are 90 degrees out of phase (like the sine and cosine functions), the pressure will ideally be at an antinode where the velocity is at a node, and vice versa. This characteristic has major implications as far as heat transfer is concerned, as will be discussed later.

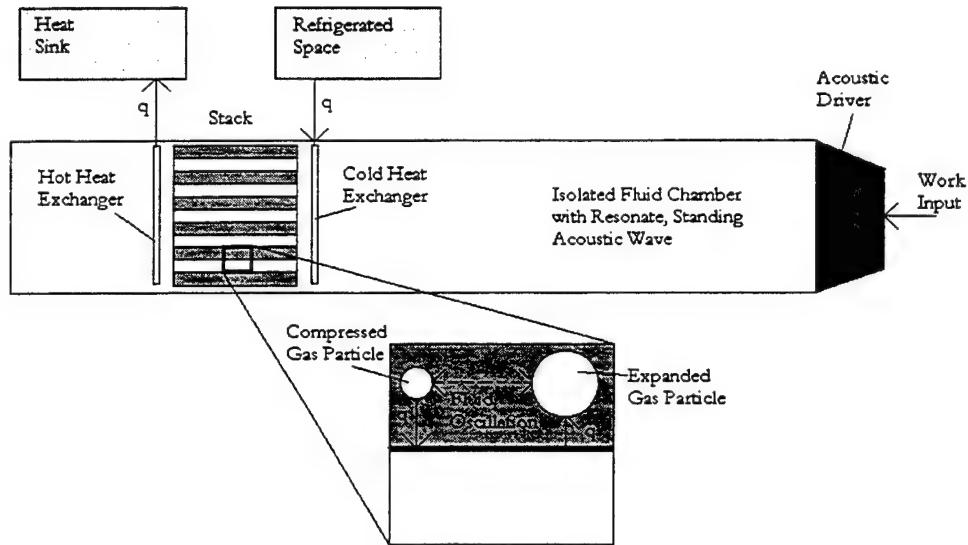


**Figure 1: Resonate Standing Acoustic Wave in an Isolated Chamber**

## B. THERMOACOUSTIC REFRIGERATION

A temperature gradient along a tube can cause pressure oscillations in the fluid along the tube surface, which can create audible sound under the right circumstances. The basic principle behind thermoacoustic refrigeration is the fact that this process can also be

reversed, i.e an acoustic field under the right circumstances can be used to create a thermal effect. Garrett and Hofler (1992), and Swift (1995), describe thermoacoustic refrigeration in detail. The simplified model in Figure 2 depicts a basic thermoacoustic refrigerator. A stack of thin plates with low thermal conductivity is placed at a specific location within an isolated sound chamber. An acoustic driver at one end oscillates the gas (typically air or a low Prandtl number gas mixture) inside the chamber. The fluid oscillates between high and low pressure locations inside the tube. According to classical thermodynamics, as a gas particle is compressed in a high-pressure region, its temperature increases. It will therefore give heat off to the stack at that location. As it oscillates back to a low-pressure region and expands, its temperature decreases, and it removes heat from the stack at that location. A heat exchanger at each end of the stack is where the stack's temperature gradient is utilized for refrigeration. Essentially, sound is the mechanical energy that serves to pump heat from the cold exchanger to the hot exchanger. The magnitude of the temperature gradient along the stack increases as the pressure ratio of the fluid oscillation increases.



**Figure 2: Thermoacoustic Refrigerator**

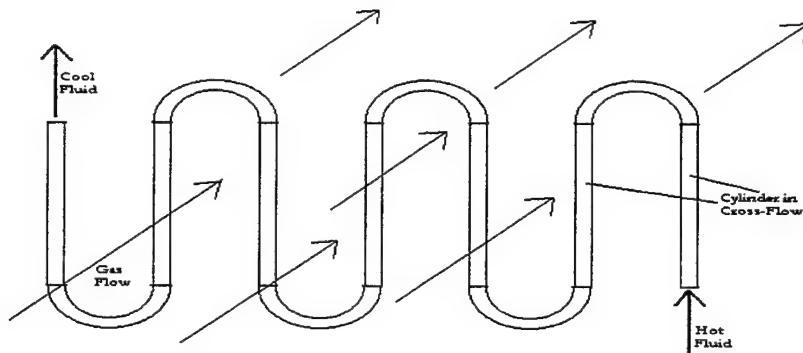
### C. BOUNDARY LAYERS

To utilize the temperature gradient along the stack, heat exchangers must be able to transfer heat away from the low temperature end of the stack to the high temperature end. These heat exchangers must be able to do this as efficiently as possible if a large temperature gradient is to be obtained.

In convective heat transfer with a uniform flow, a higher fluid velocity will generally mean a higher convective heat transfer coefficient ( $h$ ). The same is true in an oscillating fluid flow. It would seem logical, therefore to place the heat exchangers at pressure nodes, where the velocity is at a maximum. This condition may require that a gap in physical contact exist between the stack and the heat exchanger. It is therefore all the more important for the heat exchanger to be efficient.

The most common heat exchanger designs utilize several cylinders placed parallel and in line, with their plane perpendicular to the cross flow of the fluid. Garrett et al. (1994) have provided a preliminary heat exchanger design based however on the

principles of conventional mean flow analysis. Figure 3 shows a common heat exchanger tube bank type arrangement.

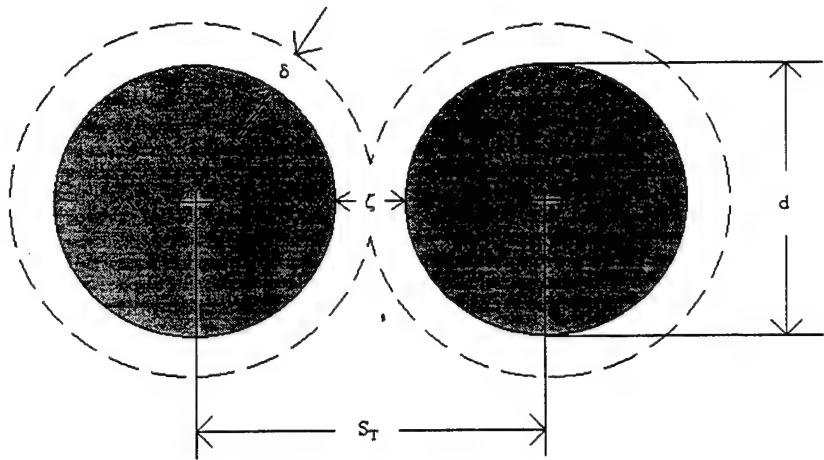


**Figure 3: Heat Exchanger**

If the parallel cylinders in a flow are close enough to each other, the boundary layer flow formed around each cylinder could interfere with the boundary layer on the adjacent cylinders. Figure 4 shows this situation. For this boundary layer interference to occur, the boundary layer thickness, ( $\delta$ ), must be at least half of the distance between the cylinders, ( $\zeta$ ). Therefore,

$$2\delta \geq \zeta$$

is the requirement for boundary layer interference to occur. In oscillating flows,  $\delta$  depends on several parameters, including the frequency of fluid oscillation, as will be discussed later. If boundary layer interference occurs, the convective heat transfer coefficient between the cylinder and the fluid may be adversely affected. The heat transfer from a bank of cylinders may therefore deviate from the heat transfer from an isolated cylinder thus resulting in reduced performance effectiveness.



**Figure 4: Boundary Layers on Cylinders in Cross Flow**

Depending on design constraints, it may become necessary to place the tubes of a heat exchanger close enough to each other so that this boundary layer interference could become an issue. If this is the case, the quantitative influence of boundary layer interaction on the convective heat transfer coefficient would need to be known in order to more effectively design a heat exchanger for a thermoacoustic refrigerator. Finding this affect of boundary layer interference on the convective heat transfer coefficient is the ultimate goal of this experimental study.

### **III. EXPERIMENT**

#### **A. INTENT**

Since a bank of cylindrical tubes may have a boundary layer interference effect on its convective heat transfer coefficient, direct extrapolation of experimental results for an isolated cylinder may not be realistic. This experiment is designed to examine the effects of spacing between the cylinders of a tube bank. A long cylindrical sound chamber was chosen for this experiment because it helps to restrict the sound waves to only the longitudinal direction of motion, thus preventing the occurrence and interference of transverse waves. Additionally, the sound chamber resembles the structure of a thermoacoustic engine, which is the practical application for which this experiment is intended.

#### **B. DIMENSIONLESS PARAMETERS**

In order to link one experimenter's results to another's, and to be able to apply results to a wide variety of situations other than the experiment itself, dimensionless parameters are necessary. Common convective heat transfer correlations for uniform flow over bluff bodies have long used such parameters as the Reynolds, Nusselt, Prandtl, and Grashof numbers. Oscillating flow is more complicated, however, and additional dimensionless parameters are necessary to fully describe the flow. Richardson (1967) gives a detailed derivation of these parameters.

## 1. Cylinder Length Scale

In order to assume that the flow around the tube bank is incompressible, the radian wavelength of the acoustic field must be large compared to the characteristic length of the cylinder. This characteristic length is chosen as the cylinder's diameter,  $d$ , and the radian wavelength,  $\lambda_R$ , is defined as

$$\lambda_R = \frac{\lambda}{2\pi} = \frac{c/f}{2\pi} = \frac{c}{\omega} \quad (1)$$

The requirement is that

$$\frac{d}{\lambda_R} \ll 1 \quad (2)$$

So  $\chi$  is defined as the ratio of the characteristic length of the cylinder to the radian wavelength

$$\chi = \frac{d}{\lambda_R} = \frac{d\omega}{c} \ll 1 \quad (3)$$

By ensuring this requirement, Lighthill (1963) showed that radiation affects due to acoustic streaming are very small and can be neglected, making only the acoustic field important.

## 2. Amplitude Parameter

Another dimensionless parameter of importance is  $\varepsilon$ , defined as the ratio of the displacement amplitude of particle oscillation to the characteristic body length. After manipulation,  $\varepsilon$  can be expressed in terms of the pressure ratio of oscillation as shown by Gopinath and Harder (2000):

$$\varepsilon = \frac{c}{d\omega} \left( \frac{P_o}{P_m} \right) \quad (4)$$

If  $\varepsilon$  is small compared to unity, the flow will remain attached to the cylinder and will be laminar. If  $\varepsilon$  becomes greater, the flow will shed from the cylinder.

## 3. Frequency Parameter

A frequency parameter,  $\Lambda^2$ , is defined as follows:

$$\Lambda^2 = \frac{d^2 \omega}{v} \quad (5)$$

Gopinath and Harder (1999) showed that if  $\Lambda^2$  is much greater than unity, the Stokes shear layer is confined to a narrow region and the acoustic streaming effect appears as slip velocity along the cylinder surface.

#### 4. Interference Parameter

For cylinders arranged with axes parallel and with uniform separation, let  $S_T$  be the center to center distance between the cylinders. Then the distance between the outer edges of the cylinders at their closest point,  $\zeta$ , is therefore

$$\zeta = S_T - 2r = S_T - d \quad (6)$$

Riley (1965) and Stuart (1966) showed that the boundary layer thickness,  $\delta$ , of the steady streaming flow generated on the cylinder at its thickest is given by:

$$\delta = 10 \sqrt{\frac{v}{\omega}} \quad (7)$$

which is used here as the separation distance criterion for interference between the boundary layers. For parallel cylinders, boundary layer interference will occur if

$$\frac{\zeta}{2\delta} < 1 \quad (8)$$

Substituting the approximation for  $\delta$  and squaring both sides, it follows that

$$\frac{\zeta^2 \omega}{400v} < 1 \quad (9)$$

is the requirement for boundary layer interference. This is called the interference parameter,  $\varphi$ , and can also be expressed in terms of other parameters

$$\varphi = \frac{\zeta^2 \omega}{400v} = \frac{d^2 \left( \frac{S_T}{d} - 1 \right)^2 \omega}{400v} = \frac{\Lambda^2}{400} \left( \frac{S_T}{d} - 1 \right)^2 \quad (10)$$

Boundary layer interference will occur if  $\varphi < 1$ .

## 5. Streaming Reynolds Number

The Reynolds number is a familiar dimensionless parameter in fluid dynamics and convective heat transfer. In oscillating flow, however, the parameter is modified to include the frequency and pressure ratio. Stuart (1966) and Riley (1966) found that both the frequency and amplitude parameter are necessary to define a suitable Reynolds number. The streaming Reynolds number,  $R_s$ , is defined as

$$R_s = \varepsilon^2 \Lambda^2 = \frac{c^2}{\omega v \gamma^2} \left( \frac{P_o}{P_m} \right)^2 \quad (11)$$

For buoyancy effects to be negligible, Gopinath and Harder (1999) showed

$$\frac{R_s^2}{G_R} \gg 1 \quad (12)$$

This criterion ensures that free convection is small compared to forced convection.

## C. APPARATUS

The equipment utilized in this experiment consists of three main assemblies: the sound chamber, the tube bank, and the instruments used for data collection.

### 1. Sound Chamber

A long cylindrical tube is used to obtain a standing, resonant, isolated acoustic wave. The chamber is made of transparent plexi-glass. The inside diameter is 3" (~76mm), and the wall thickness is  $\frac{1}{4}$ " (~6mm). The length of the chamber is 2m. The Chamber is supported by eight stantions along its length, connected to a plexi-glass base plate. At one end of the chamber is the acoustic driver, and at the other end is an adjustable endplate that allows the length of the tube to be varied. The end plate makes an airtight seal to the inside chamber wall with a rubber O-ring. Figure 5 shows the sound chamber. The acoustic driver is a JBL® Model 2490H midrange compression driver with  $8\Omega$  impedance and a frequency range of 250Hz to 2.5kHz.

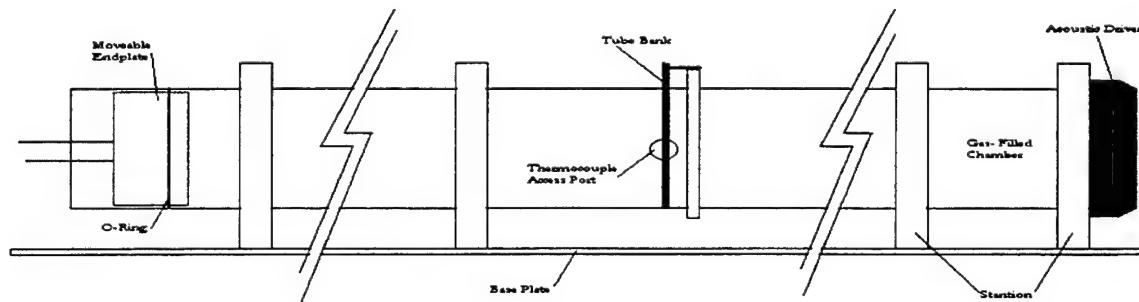


Figure 5: Experimental Sound Chamber

## 2. Tube Bank

The tube bank consists of a central heated cylinder and two “dummy” cylinders on each side of it. The heated cylinder is a smooth surfaced Watlow® cartridge heater with a 1/8” diameter. In addition to the internal heating element, the heater contains a type J thermocouple to measure the surface temperature of the cylinder. When inside the sound chamber, the cylinder length to diameter ratio is  $\sim 24$ , which ensures that end effects can be considered negligible for heat transfer calculations. The “dummy” cylinders are smooth 1/8” diameter brass tubes. The cylinders are put into the sound chamber through oblong grooves cut through the chamber’s top and bottom surfaces. The grooves allow the spacing between the cylinders,  $S_T$ , to be varied. The tubes are held in place by an aluminum plate fastened to the outside of the chamber. Figure 6 shows the tube bank arrangement. In order to ensure that the sound chamber is sealed and isolated from the outside air, Silly Putty® is used to fill the grooves around the cylinders.

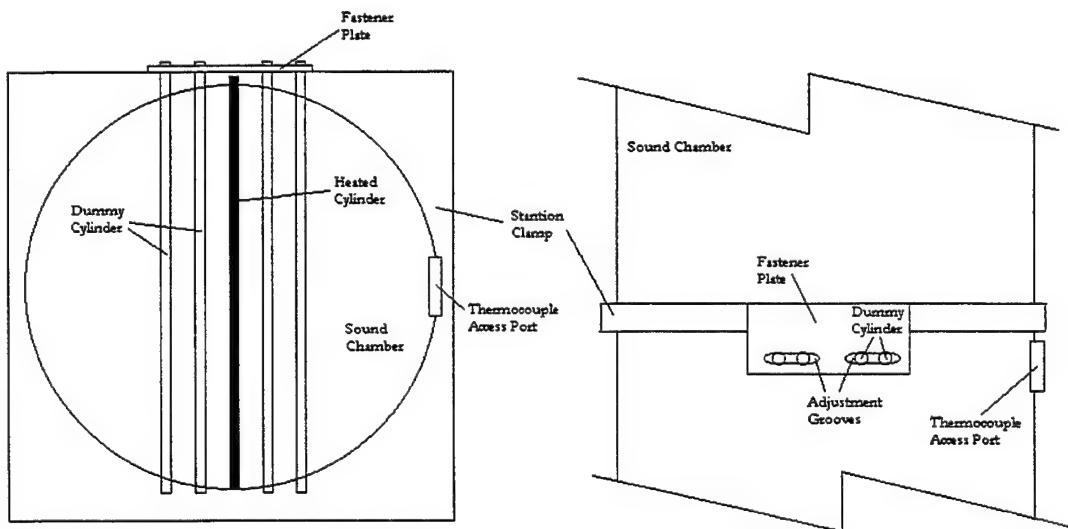


Figure 6: Tube Bank

### 3. Electronic Instruments Package

A Hewlett Packard® 33120A variable waveform generator is used to power the acoustic driver with a sinusoidal signal at the desired frequency. Prior to being input to the acoustic driver, the signal is amplified by a Techron® 7540 power amplifier.

The adjustable endplate of the sound chamber was fitted with an Endevco® model 8510B-5 pressure transducer. The transducer's sensitivity,  $S$ , is 50.89mV/psi. The transducer output goes to a pre-amp with a gain,  $G$ , of 100, which gives an amplified gain of 5089mV/psi. The pre-amp then is input into a Hewlett Packard® 3562A dynamic signal analyzer. The signal analyzer allows the output from the pressure transducer,  $V_{mic}$ , to be observed in both time domain and power spectrum outputs. Using the power spectrum output, the pressure ratio of the resonant wave inside the chamber can be calculated as follows

$$\frac{P_o}{P_m} = \frac{V_{mic}/SG}{P_m} \quad (13)$$

Where  $P_m$  is the mean atmospheric pressure of 14.7psi, and  $P_o$  is the difference between the maximum pressure in the sound chamber (which occurs at pressure antinodes, or velocity nodes) and  $P_m$ . The power spectrum also allows disturbances from harmonics and other sources to be observed so that they can be minimized.

The power to the heated cylinder is supplied by a Kikusui® model PAR 160A regulated DC power supply. To measure the power to the heater, the voltage drop across it and the current running through it are measured. A Hewlett Packard® 34401A digital

multimeter is placed in parallel with the heater to measure the voltage across it,  $V_H$ . The current through the heater,  $I_H$ , is calculated by measuring the voltage drop across a resistor of known resistance,  $R_R$ , and applying Ohm's law

$$I_H = I_R = \frac{V_R}{R_R} \quad (14)$$

Figure 7 is the electrical circuit used to calculate the power to the heated cylinder.

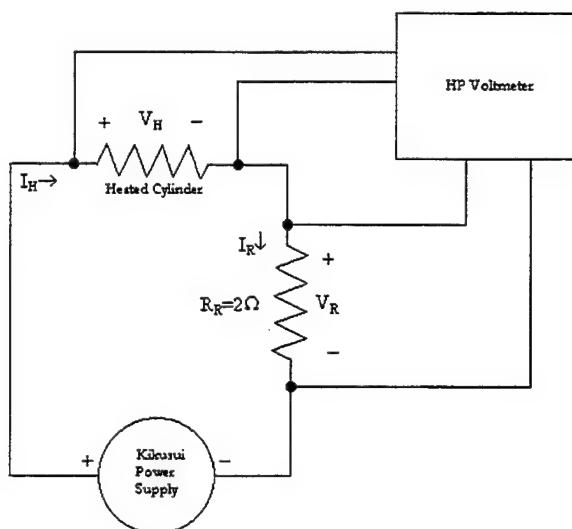


Figure 7: Heater Circuit

Finally, a Keithley® 740 system-scanning thermometer is used to measure the heated cylinder surface temperature and the ambient fluid temperature. As stated earlier, the heater is supplied with an internal type J thermocouple. The ambient temperature is taken with a type E thermocouple inside a small probe. The probe is inserted into the

sound chamber via a removable access port in the side of the chamber. The thermometer can be toggled between the thermocouples to record both temperatures.

Figure 8 shows the schematic of the instruments used in the experiment. Figure 9 is a photograph of the experimental apparatus.

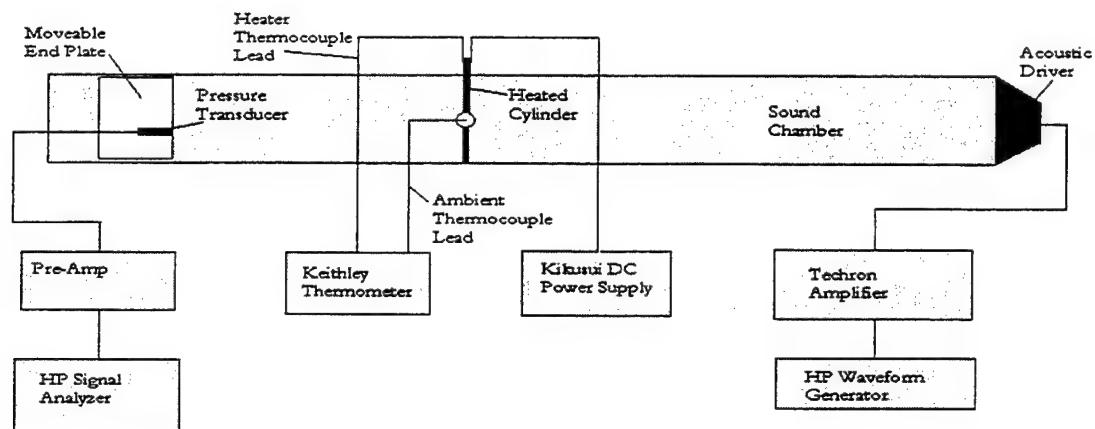


Figure 8: Instruments Schematic

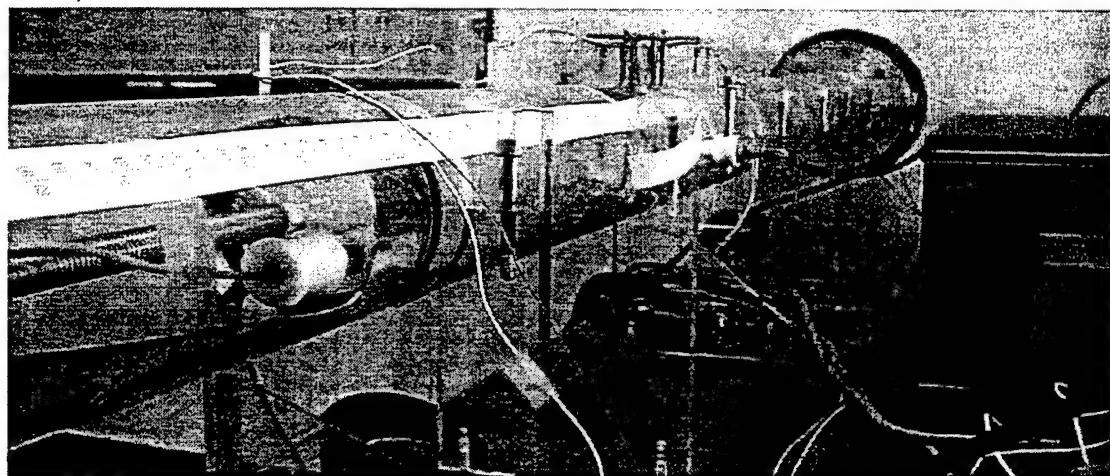


Figure 9: Photograph of Experimental Apparatus

#### D. PROCEDURE

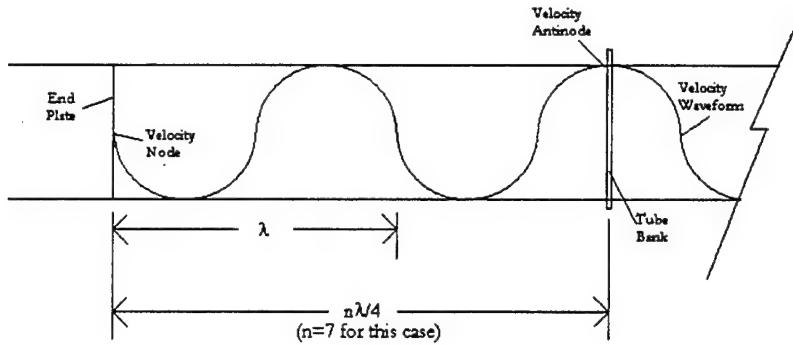
Before data "runs" could begin, frequencies and corresponding chamber lengths had to be found that would set up a resonant, standing wave inside the chamber with a velocity antinode at the tube bank location. From Figure 10, it is obvious that the distance  $L$  must be an odd multiple of  $\lambda/4$ . Put another way,

$$n = \frac{4Lf}{c} \quad (15)$$

and  $n$  must be an odd integer. To accomplish this, a pressure transducer was placed at the chamber surface at the location of the tube bank. The acoustic driver was then powered with an arbitrary frequency, and an arbitrary tube length. The frequency was adjusted until  $V_{mic}$  was at a minimum. Next,  $n$  was calculated to see if it was indeed an odd integer. If not, the chamber length was adjusted by moving the endplate and the process was repeated. In all, 6 resonant frequencies were found. These frequencies are listed in Table 1.

f (Hz)	L (m)	n	max $P_o/P_m$ (%)
383	0.24	1.069	~3.3
676	0.65	5.109	~3.1
723	0.6	5.044	~3
925	0.65	6.991	~2.8
1202	0.65	9.085	~2
1461	0.65	11.04	~1.3

Table 1: Resonate Frequencies Used



**Figure 10: Geometry for Maximum Velocity at Tube Bank**

Once the frequencies are identified, it is necessary to determine the maximum possible pressure ratio for each frequency, without too much interference from harmonics and other sources. This is done by observing the power spectrum. Since the first harmonic of the frequency,  $2f$ , is out of phase with the primary signal, it will not interfere. However, the second harmonic,  $3f$ , is in phase and will therefore interfere with the primary signal. The pressure ratio was increased until the transducer voltage from the second harmonic was 5% of the primary signal. This value of 5% interference was taken as the cutoff for the maximum pressure ratio. The maximum pressure ratio for each frequency is listed in Table 1.

After the resonant frequencies and the maximum possible pressure ratios were found, the data collection could begin. The first step was to set the tube bank spacing. Four values of  $S_T/d$  were used in this experiment; 1.25, 1.5, 1.75, and 2.0. The spacing

was measured to .001" using calipers. After the spacing was set, the tubes were inserted into the chamber and sealed with putty.

Once the spacing was set, the data collection could begin. First, the power to the heated cylinder was engaged. The heater would then begin to rise in temperature, which was monitored by the thermometer. Next, the acoustic driver was powered by turning on the power amplifier. The power to the driver was increased until the temperature of the heater would level off and attain a steady state value. If the pressure ratio of the driver was too small, the heater would continue to rise in temperature. If the pressure ratio was too large, the heater temperature would begin to decrease. Once a steady state temperature was achieved, the data was recorded.  $V_{mic}$  was recorded first, then  $V_H$  and  $V_R$ . The steady state temperature of the heater,  $T_H$ , was recorded, then the power to the driver and the power to the heater were simultaneously disengaged. The ambient thermocouple probe was then inserted into the chamber and the ambient temperature recorded. This completed the data collection for one data point. For each frequency, at each tube spacing, twenty data points were taken. The voltage across the heater was then raised slightly and the process repeated.

Once the data was collected, the Nusselt number and Streaming Reynolds Number were calculated using a computer spreadsheet. The Nusselt number,  $Nu_d$ , is defined as

$$Nu_d = \frac{hd}{k_{air}} \quad (16)$$

Where the convective heat transfer coefficient,  $h$ , is defined as

$$h = \frac{Q_H}{A_H(\Delta T)} \quad (17)$$

The power to the heater is

$$Q_H = I_H V_H = \frac{V_R}{R_R} V_H \quad (18)$$

Additionally,

$$A_H = \pi d L_H \quad (19)$$

$$(\Delta T) = T_H - T_A \quad (20)$$

Using Eqns. (16) through (20),  $Nu_d$  was calculated by

$$Nu_d = \frac{V_R V_H}{\pi R_R L_H (T_H - T_A) k_{air}} \quad (21)$$

The values of  $\varepsilon$ ,  $\chi$ ,  $\Lambda^2$ ,  $\phi$ , and  $R_s$  were then calculated as described previously. The speed of sound, the kinematic viscosity, and  $k_{air}$  were calculated at the average fluid temperature

$$T_{avg} = \frac{T_H + T_A}{2} \quad (22)$$

## IV. RESULTS AND DISCUSSION

A total of over 450 individual data points were calculated for the six frequencies and four tube spacing values as described in the previous chapter. Table 2 shows the ranges of the different dimensionless parameters covered during the experiment.

Parameter	min	max
epsilon	0.01	1
x	0.02	0.08
A^2	1500	5900
phi	0.2	15
Po/Pm	0.50%	3.30%
Rs	<10	1500

**Table 2: Parameter Ranges Used**

For values of  $\phi > 1$ , the results replicate those of an isolated cylinder (to within experimental error). Although this conclusion might have been expected since there is no boundary layer interference anticipated in this regime, it nonetheless provides a firm corroboration with the earlier single cylinder results of Gopinath & Harder (2000). For “low” values of  $R_s$  the relationship between  $Nu_d$  and  $R_s$  is expected to be of the form

$$Nu_d = Y \Pr^x R_s^{0.5} \quad (23)$$

which exemplifies the laminar, attached flow regime. This low-amplitude attached and laminar behavior of the flow has also been demonstrated by Sarpkaya (1986) in an independent context, i.e. on the basis of force measurements on a cylinder in an

oscillatory flow. Since  $\text{Pr}$  is constant throughout this heat transfer experiment ( $\text{Pr}_{\text{air}}=0.7$ ), it can be included in the constant  $Y$  and the relationship becomes

$$Nu_d = CR_s^{0.5} \quad (24-a)$$

Gopinath and Harder (2000) found that at larger values of  $R_s$ , the data has a steeper trend, roughly proportional to  $R_s^{0.75}$  which may be attributable to vortex shedding resulting from flow instabilities. For  $R_s$  values  $>500$ , the data was correlated using the form

$$Nu_d = CR_s^{0.75} \quad (24-b)$$

Table 3 shows the values of the constant  $C$  in Eqns. (24-a) and (24-b), correlated using a transition of  $R_s=500$ . Figures 11-13 are logarithmic plots of  $Nu_d$  vs.  $R_s$  for  $S_T/d$  values of 1.5, 1.75, and 2.0, respectively. Best-fit lines are constructed from Eqns. (24-a) and (24-b). Error bars from an uncertainty analysis (Appendix C) are included for arbitrary data points. Figure 14 is a plot of  $Nu_d$  vs.  $R_s$  for all data corresponding to  $\phi>1$ .

Davidson (1973) predicted a correlation of  $Nu_d=1.05R_s^{0.5}$  for the attached flow regime, while Gopinath and Harder (2000) found the leading coefficient to be 0.90. For “large” values of  $R_s$ , Gopinath and Harder (2000) have suggested that the correlation should be  $Nu_d=0.20R_s^{0.75}$ . Table 3 also includes the percentage deviation of the current experiment from these previous correlations.

ST/d	Rs<500			Rs>500		
	c	%Dev from Davidson	% Dev. From G&H	c	% Dev. From G&H	
1.50	1.08	3	20.1	0.218	8.95	
1.75	0.91	-13.4	1.1	0.192	-3.8	
2.00	1.14	8.7	26.8	0.219	9.55	
all	1.08	3	19.8	0.203	1.35	

Table 3: Correlation Data for  $\phi>1$

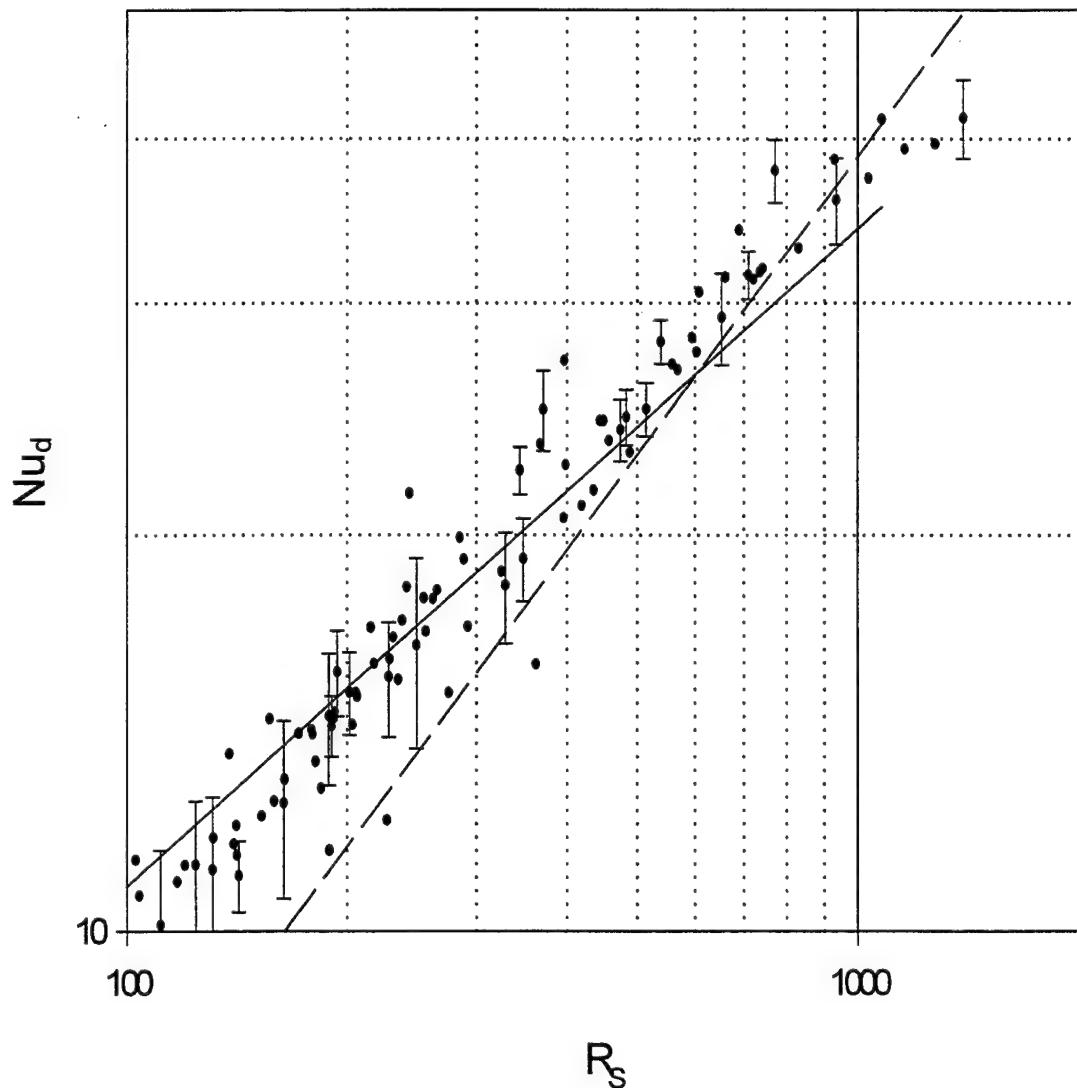


Figure 11: Nusselt Number vs. Streaming Reynolds Number for  $S_t/d=1.5$ .

The solid line is a  $Rs^{0.5}$  fit through the data. The dashed line is a  $Rs^{0.75}$  fit in the vortex shedding regime. Error bars are included for arbitrary data points.

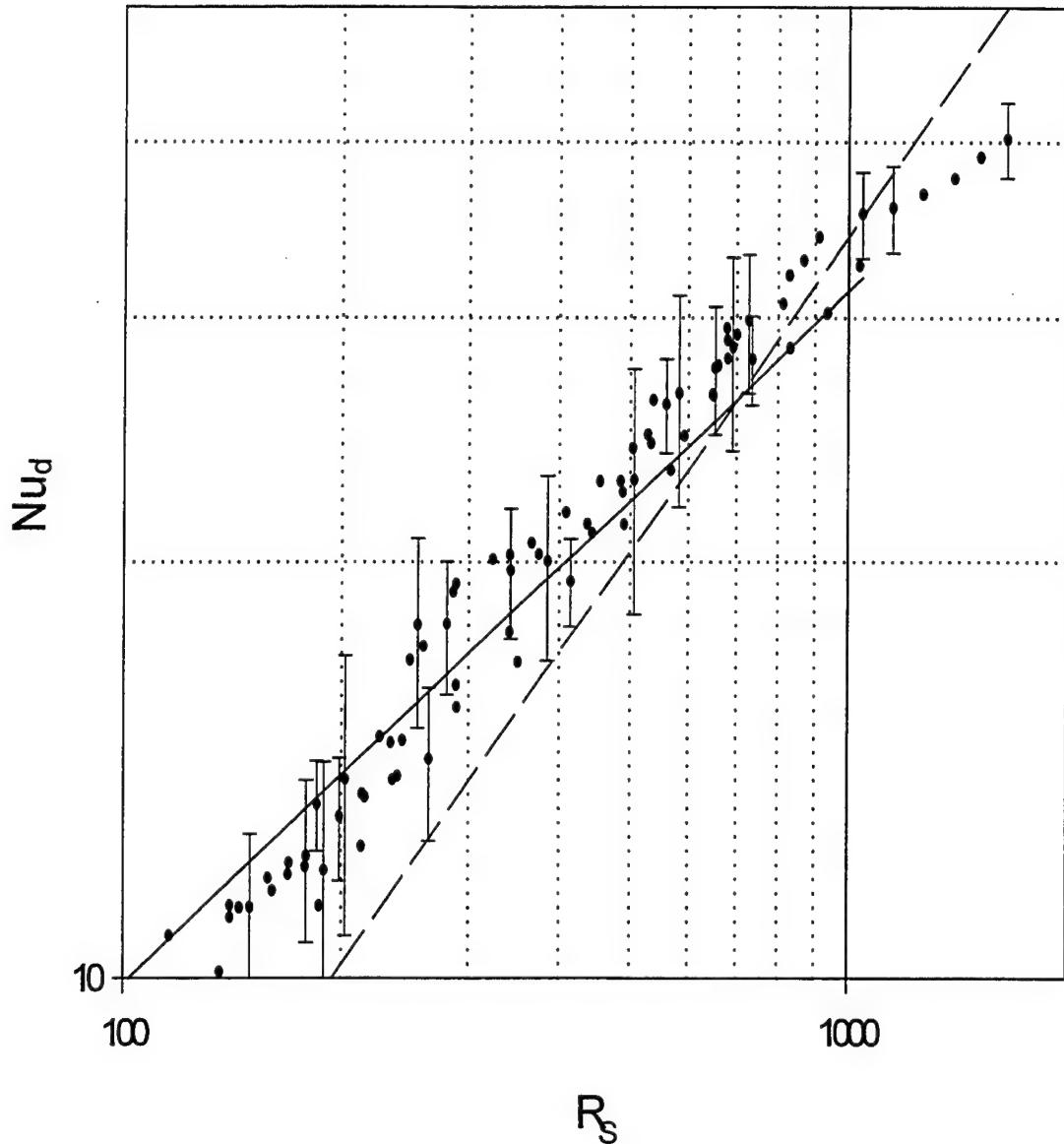


Figure 12: Nusselt Number vs. Streamwise Reynolds Number for  $S_t/d=1.75$ .

The solid line is a  $R_s^{0.5}$  fit through the data. The dashed line is a  $R_s^{0.75}$  fit in the vortex shedding regime. Error bars are included for arbitrary data points.

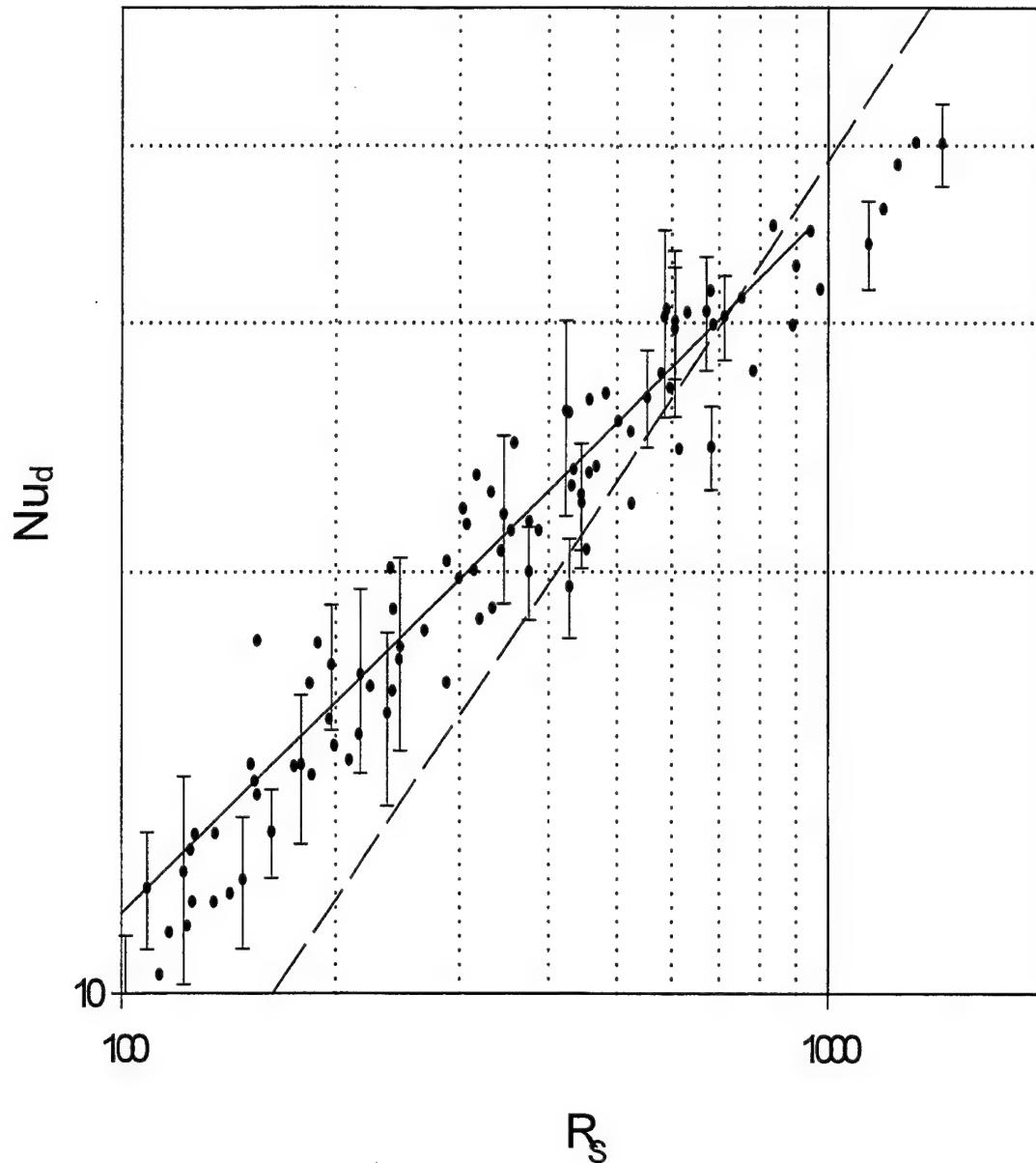
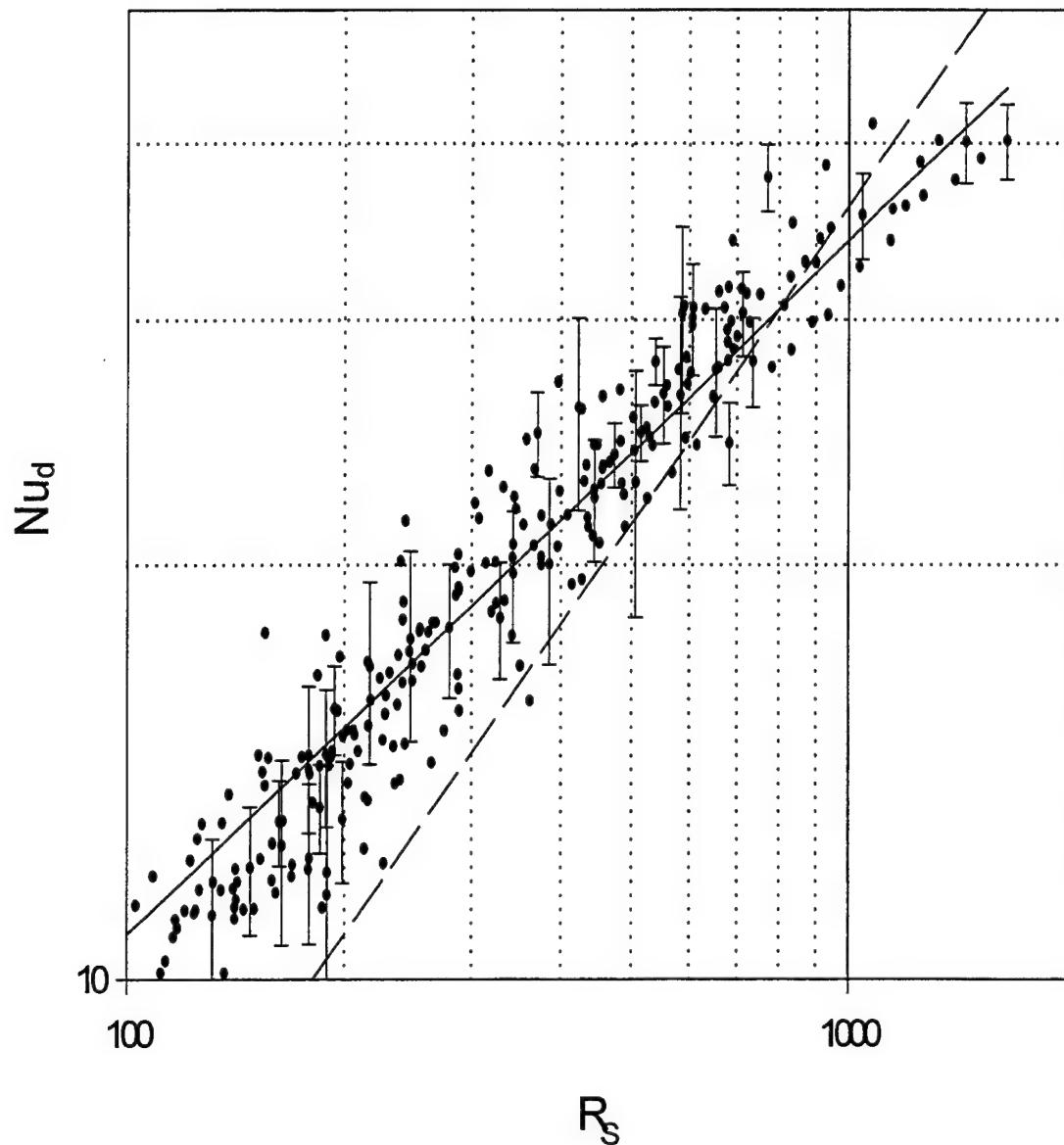


Figure 13: Nusselt Number vs. Streaming Reynolds Number for  $S_T/d=2.0$ .

The solid line is a  $R_s^{0.5}$  fit through the data. The dashed line is a  $R_s^{0.75}$  fit in the vortex shedding regime. Error bars are included for arbitrary data points.



**Figure 14: Nusselt Number vs. Streaming Reynolds Number for all  $\phi > 1$ .**

The solid line is a  $R_s^{0.5}$  fit through the data. The dashed line is a  $R_s^{0.75}$  fit in the vortex shedding regime. Error bars are included for arbitrary data points.

Figures 11-14 indicate that the data from individual frequencies cannot be distinguished from one other. With  $\varphi > 1$ , the data falls along roughly the same curve.  $Nu_d$  is independent of the tube spacing, and  $\varphi$  is not necessary to correlate the data.

Figure 15 is a logarithmic plot of  $Nu_d$  vs.  $R_s$  for  $S_t/d = 1.25$ . For this close spacing,  $\varphi < 1$  for all frequencies used, and boundary layer interference becomes an issue. From Figure 15 it is obvious that the data for the different frequencies do not fall on the same curve.  $Nu_d$  can not be correlated with  $R_s$  alone, and the influence of  $\varphi$  must also be included. This data was correlated using the form

$$Nu_d = C\varphi^a R_s^b \quad (25)$$

Again, there was a transition at  $R_s = 500$ , so the correlations used  $b = 0.5$  for  $R_s < 500$ , and  $b = 0.75$  for  $R_s > 500$ . The following results were found

$$Nu_d = 1.07\varphi^{0.19} R_s^{0.5} \quad R_s < 500, \varphi < 1 \quad (26-a)$$

$$Nu_d = 0.21\varphi^{0.11} R_s^{0.75} \quad R_s > 500, \varphi < 1 \quad (26-b)$$

Eqns. (26-a) and (26-b) show that as  $\varphi \rightarrow 1$ , the correlations converge to those of an isolated cylinder.

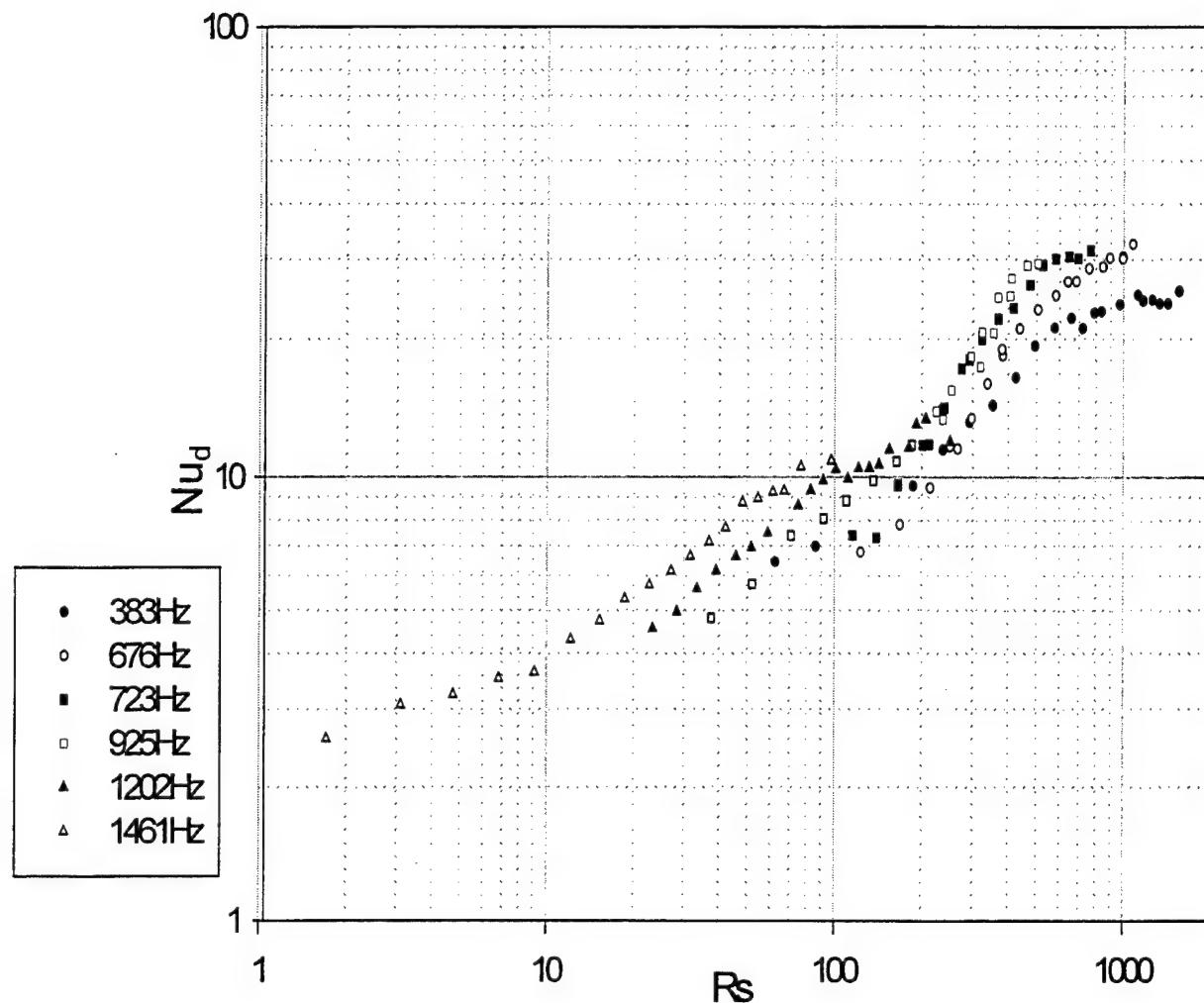


Figure 15: Nusselt Number vs. Streaming Reynolds Number for  $ST/d=1.25$ .

The interference parameter  $\varphi$  is  $<1$  for all frequencies.

## V. CONCLUSIONS AND RECOMMENDATIONS

Experiments were performed to determine the effect of tube spacing on convective heat transfer from a tube bank in a zero mean oscillating flow. A tube bank is used to model a heat exchanger. The role of the interference of boundary layers on adjacent tubes in the tube bank was discussed. The effect of boundary layer interference is needed to design more efficient heat exchangers for thermoacoustic engines.

Without boundary layer interference, the heat transfer from a tube bank closely follows that of an isolated cylinder. It was found that, as expected, the Nusselt number does not depend on tube pitch for sufficiently large spacings corresponding to values of  $\phi$  greater than 1. However for values of  $\phi$  less than 1, the Nusselt number must be correlated to  $\phi$  as well as  $R_s$ . As the tube spacing and hence  $\phi$  decreases, the heat transfer rate characterized by  $Nu_d$  is degraded. However, the decrease in  $Nu_d$  is not great, especially at high values of  $R_s$ . At high streaming Reynolds numbers,  $\phi$  can be as low as 0.12 although  $Nu_d$  is still at 80% of its value for  $\phi=1$ . At low streaming Reynolds numbers,  $\phi$  can be as low as 0.32 and still have less than 20% degradation in  $Nu_d$ . It can be concluded that only a small sacrifice in heat transfer will result from having closely spaced tubes. Provided that  $\phi$  is not too small, heat exchanger designs can use a cluster of many closely spaced tubes, allowing more cooling fluid to be transported, without significantly degrading the heat transfer characteristics of each tube.

Based on a random error propagation analysis, it was determined that the greatest source of uncertainty came from temperature measurements. Future experiments would benefit from more precise measurements of temperature. Additionally, the way in which the ambient temperature is measured could be improved. Instead of inserting a

thermocouple probe into the sound chamber after the data run, a thermocouple permanently fixed to the inside surface of the sound chamber, in such a way as to not interfere with the flow characteristics, would allow the ambient temperature and cylinder temperature to be recorded simultaneously.

To carry this study further, it is recommended that a similar experiment be conducted to determine the affect of an in-line arrangement of cylinders, that is, a bank of cylinders arranged with their plane parallel to the direction of fluid oscillation. Such an experiment could study both aligned and staggered cylinders as in conventional heat exchanger tube bank arrangements. Additionally, determining the heat transfer characteristics of finned cylinders would greatly benefit heat exchanger design. Finally, experiments with fluids other than air would allow a Prandtl number dependence to be studied.

## APPENDIX

### A. SAMPLE CALCULATIONS

The following sample calculations use the following data:

Measured Values:

$$\begin{aligned} S_T/d &= 1.25 \\ L &= .65 \text{ m} \\ f &= 676 \text{ Hz} \\ V_{\text{mic}} &= 1878 \text{ mV} \\ V_R &= 0.17225 \text{ V} \\ V_H &= 10.2805 \text{ V} \\ T_H &= 28.6 \text{ }^{\circ}\text{C} \\ T_A &= 22.9 \text{ }^{\circ}\text{C} \end{aligned}$$

Constants:

$$\begin{aligned} R_{\text{air}} &= 287 \text{ m}^2/\text{s}^2\text{K} \\ \gamma &= 1.4 \\ P_m &= 14.7 \text{ psi} \\ L_H &= .076 \text{ m} \\ S &= 50.89 \text{ mV/psi} \\ G &= 100 \\ d &= .003175 \text{ m} \end{aligned}$$

#### 1. Nusselt Number

The average fluid temperature is:

$$T_{\text{avg}} = \frac{T_H + T_A}{2} = \frac{28.6 \text{ }^{\circ}\text{C} + 22.9 \text{ }^{\circ}\text{C}}{2} = 25.75 \text{ }^{\circ}\text{C} = 298.9 \text{ K} \quad (\text{A-1})$$

From this, the following values are taken from Kays (XXX):

$$k_{\text{air}} = .0260646 \text{ W/mK}$$

$$\nu = .00001563 \text{ m}^2/\text{s}$$

$\Delta T$  is calculated as follows:

$$\Delta T = T_H - T_A = 28.6^\circ C - 22.9^\circ C = 5.7^\circ C = 5.7 K \quad (A-2)$$

The Nusselt number is then calculated:

$$Nu_d = \frac{V_R V_H}{\pi R_R L_H (\Delta T) k_{air}} = \frac{(0.17225V)(10.2805V)}{\pi(2\Omega)(.076m)(5.7K)(.0260646 W/mK)} = 24.96 \quad (A-3)$$

## 2. Streaming Reynolds Number

The speed of sound is given by:

$$c = \sqrt{\gamma R_{air} T_{avg}} = \sqrt{(1.4) \left( 287 \frac{m^2}{s^2 K} \right) (298.9 K)} = 346.55 \frac{m}{s} \quad (A-4)$$

The pressure ratio is given by:

$$\frac{P_o}{P_m} = \frac{V_{mic}/SG}{P_m} = \frac{1878 \frac{mV}{psi}}{\left( 50.89 \frac{mV}{psi} \right) (100)} = .0251 \quad (A-5)$$

The angular frequency is:

$$\omega = 2\pi f = \left( 2\pi \frac{rad}{cycle} \right) (676 Hz) = 4247.433 \frac{rad}{s} \quad (A-6)$$

The streaming Reynolds number is then:

$$R_s = \frac{c^2}{\omega \nu \gamma^2} \left( \frac{P_o}{P_m} \right)^2 = \frac{\left( 346.55 \frac{m}{s} \right)^2}{\left( 4247.433 \frac{rad}{s} \right) \left( 0.00001563 \frac{m^2}{s} \right) (1.4)^2} (.0251)^2 = 581.5 \quad (A-7)$$

## B. UNCERTAINTY ANALYSIS

This uncertainty analysis is done using uncertainty propagation found in Beckwith et al. (1993).

### 1. Nusselt Number

The Nusselt number equation is:

$$Nu_d = \frac{hd}{k_{air}} = \frac{V_H V_R}{\pi L_H R_R \Delta T k_{air}} \quad (A-8)$$

The fractional uncertainty of the Nusselt number is:

$$\frac{u_{Nu_d}}{Nu_d} = \sqrt{\left(\frac{u_{\Delta T}}{\Delta T}\right)^2 + \left(\frac{u_{V_R}}{V_R}\right)^2 + \left(\frac{u_{V_H}}{V_H}\right)^2 + \left(\frac{u_{R_R}}{R_R}\right)^2 + \left(\frac{u_{L_H}}{L_H}\right)^2 + \left(\frac{u_{k_{air}}}{k_{air}}\right)^2} \quad (A-9)$$

The uncertainties of the temperature measurements are  $0.5^\circ\text{C}$ . With  $\Delta T = T_H - T_A$ , the uncertainty of the temperature difference is:

$$u_{\Delta T} = \sqrt{\left(\frac{\partial \Delta T}{\partial T_H} u_{T_H}\right)^2 + \left(\frac{\partial \Delta T}{\partial T_A} u_{T_A}\right)^2} = \sqrt{[(1)(0.5^\circ\text{C})]^2 + [(1)(0.5^\circ\text{C})]^2} = .7071^\circ\text{C} = .7071K \quad (A-10)$$

The uncertainties in the voltage measurements are taken from the HP multimeter's users manual:

$$u_{VR} = u_{VH} = 0.05\% \text{ reading} + 0.02\% \text{ full scale output}$$

The resistance uncertainty is 1% of the resistor value. The uncertainty of the heater length is  $0.001"$ . The uncertainty of  $k_{air}$  is  $0.00005 \text{ W/mK}$ .

### 2. Streaming Reynolds Number

The streaming Reynolds number is:

$$R_S = \left( \frac{R_{air}}{2\pi\gamma P_m^2} \right) \frac{T_{avg} V_{mic}^2}{fvG^2 S^2} \quad (A-11)$$

The fractional uncertainty is then:

$$\frac{u_{R_S}}{R_S} = \sqrt{\left( \frac{u_{T_{avg}}}{T_{avg}} \right)^2 + \left( \frac{u_f}{f} \right)^2 + \left( \frac{u_v}{v} \right)^2 + \left( 2 \frac{u_{V_{mic}}}{V_{mic}} \right)^2 + \left( 2 \frac{u_G}{G} \right)^2 + \left( 2 \frac{u_S}{S} \right)^2} \quad (A-12)$$

With  $T_{avg} = (T_H + T_A)/2$ , the uncertainty in  $T_{avg}$  is:

$$u_{T_{avg}} = \sqrt{\left( \frac{\partial T_{avg}}{\partial T_H} u_{T_H} \right)^2 + \left( \frac{\partial T_{avg}}{\partial T_A} u_{T_A} \right)^2} = \sqrt{\left( \frac{0.5^\circ C}{2} \right)^2 + \left( \frac{0.5^\circ C}{2} \right)^2} = 0.3536^\circ C = 0.3536 K \quad (A-13)$$

The uncertainty in the frequency is taken from the HP waveform generator user's manual:

$$u_f = 20 \times 10^{-6} \times \text{reading}$$

The uncertainty in  $v$  is  $5 \times 10^{-10} \text{ m}^2/\text{s}$ . The uncertainty in  $V_{mic}$  is 5mV. The uncertainty in  $G$  is 0.4. The uncertainty in  $S$  due to nonlinearity is given by the pressure transducer calibration data as 0.381mV/psi.

### **C. EXPERIMENTAL DATA**

The following pages contain the data gathered through experimentation in computer spreadsheet form. All important parameters are listed, although some constants have been omitted to reduce size.

#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tau9 (C)	k(W/mK)	Nu	c (m/s)	v(m^2/s)	PR	epsilon	X	n^2	Rs	phi	Std	1.25	L (m)	0.24000
																			1.25	0.24000	L (m)	0.24000
1	383	544	0.08368	4.99560	28	23.2	4.8	25.6	0.026054	6.9998	346.465	1.56E-05	0.00727	0.23554	0.022	1554	86.189	0.243				
2	383	463	0.08195	4.89270	28.2	23.2	5	25.7	0.026061	6.444	346.523	1.56E-05	0.00619	0.2005	0.022	1553	62.417	0.243				
3	383	1577	0.19517	11.65210	32.2	23.6	8.6	27.9	0.026222	21.119	347.796	1.56E-05	0.02108	0.68942	0.022	1533	720.04	0.239				
4	383	1651	0.20544	12.26480	32.3	23.5	8.8	27.9	0.026222	22.887	347.796	1.56E-05	0.02207	0.77158	0.022	1533	789.2	0.239				
5	383	1700	0.22101	13.19470	33.7	23.6	10.1	28.65	0.026276	23.011	348.229	1.56E-05	0.02272	0.7398	0.022	1526	835.14	0.238				
6	383	1971	0.23521	14.04250	34.2	23.7	10.5	28.95	0.026298	26.049	348.402	1.56E-05	0.02635	0.88616	0.022	1523	1121.8	0.238				
7	383	1833	0.23922	14.28190	35.1	23.7	11.4	29.4	0.026331	23.835	348.661	1.6E-05	0.02415	0.79867	0.022	1519	969.09	0.237				
8	383	2090	0.24621	14.69890	35.5	23.7	11.8	29.6	0.026345	24.378	348.776	1.6E-05	0.02794	0.91095	0.022	1517	1269.2	0.237				
9	383	2154	0.25628	15.30020	36.7	23.7	13	30.2	0.026389	23.936	349.122	1.6E-05	0.02879	0.93977	0.022	1512	1335.5	0.236				
10	383	2229	0.25628	15.30020	36.8	23.8	13	30.3	0.026396	23.929	349.179	1.61E-05	0.0298	0.97265	0.022	1511	1429.8	0.236				
11	383	2010	0.22268	13.29430	33.3	23.6	9.7	28.45	0.026262	24.338	348.113	1.59E-05	0.02687	0.87441	0.022	1528	1168.1	0.239				
12	383	2325	0.21700	12.95520	32.4	23.6	8.8	28	0.026229	25.508	347.854	1.56E-05	0.03108	1.01069	0.022	1532	1564.7	0.239				
13	383	1507	0.20163	12.03750	32.2	23.5	8.7	27.85	0.026218	22.283	347.767	1.56E-05	0.02014	0.65494	0.022	1533	657.62	0.24				
14	383	1410	0.18722	11.17750	31.5	23.6	7.9	27.55	0.026196	21.176	347.594	1.56E-05	0.01985	0.61248	0.022	1536	578.13	0.24				
15	383	1304	0.17412	10.39550	30.9	23.4	7.5	27.15	0.026167	19.315	347.362	1.56E-05	0.01743	0.56866	0.022	1539	493.26	0.241				
16	383	1209	0.15069	8.99820	30	23.4	6.6	26.7	0.026134	16.458	347.102	1.57E-05	0.01616	0.52442	0.022	1544	424.5	0.241				
17	383	1103	0.13720	8.19990	29.6	23.3	6.3	26.45	0.026116	14.303	346.957	1.57E-05	0.01474	0.47825	0.022	1546	353.55	0.242				
18	383	1003	0.12944	7.72780	29.5	23.4	6.1	26.45	0.026116	13.149	346.957	1.57E-05	0.01341	0.43489	0.022	1546	292.35	0.242				
19	383	901	0.10931	6.52570	28.4	23.4	5	25.9	0.026076	11.457	346.639	1.56E-05	0.01204	0.3903	0.022	1551	238.25	0.242				
20	383	799	0.09583	5.70920	27.9	23.3	4.6	25.6	0.026054	9.5398	346.465	1.56E-05	0.01068	0.34594	0.022	1554	186.93	0.243				
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tau9 (C)	k(W/mK)	Nu	c (m/s)	v(m^2/s)	PR	epsilon	X	n^2	Rs	phi				

UdTTT	UVR/NR	UVH/VH	Ud/k	UNu/Nu	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1473	0.0003	0.0001	0.0004	0.14765	1.03354	0.0276211	0.00002	3E-05	0.0091912	0.0034	0.0075	0.03703	3.19164
0.1414	0.0003	0.0001	0.0004	0.14177	0.9136	0.0275136	0.00002	3E-05	0.0107991	0.0034	0.0075	0.03865	2.4125
0.0822	0.0002	0.0001	0.0004	0.05283	1.74925	0.0253441	0.00002	3E-05	0.0031706	0.0034	0.0075	0.03087	22.2278
0.0804	0.0002	0.0001	0.0004	0.06097	1.8516	0.0253441	0.00002	3E-05	0.0030265	0.0034	0.0075	0.03081	24.3178
0.07	0.0002	0.0001	0.0004	0.07072	1.6274	0.0246806	0.00002	3E-05	0.0028412	0.0034	0.0075	0.03024	25.251
0.0673	0.0002	0.0001	0.0004	0.06808	1.70545	0.0244249	0.00002	3E-05	0.0025368	0.0034	0.0075	0.02988	33.5177
0.062	0.0002	0.0001	0.0004	0.06283	1.49757	0.024051	0.00002	3E-05	0.0027278	0.0034	0.0075	0.02864	28.7258
0.0599	0.0002	0.0001	0.0004	0.06076	1.4811	0.0238885	0.00002	3E-05	0.0023923	0.0034	0.0075	0.02939	37.0141
0.0544	0.0002	0.0001	0.0004	0.05531	1.32381	0.0234139	0.00002	3E-05	0.0023213	0.0034	0.0075	0.02899	38.7119
0.0544	0.0002	0.0001	0.0004	0.05531	1.32345	0.0233366	0.00002	3E-05	0.0022432	0.0034	0.0075	0.0289	41.3197
0.0729	0.0002	0.0001	0.0004	0.07358	1.79072	0.0246541	0.00002	3E-05	0.0024876	0.0034	0.0075	0.03021	35.2935
0.0804	0.0002	0.0001	0.0004	0.08097	2.08535	0.0252536	0.00002	3E-05	0.0021505	0.0034	0.0075	0.03044	47.6316
0.0813	0.0002	0.0001	0.0004	0.08169	1.82478	0.0253896	0.00002	3E-05	0.0033179	0.0034	0.0075	0.03097	20.3661
0.0895	0.0002	0.0001	0.0004	0.08007	1.90723	0.0256661	0.00002	3E-05	0.0035461	0.0034	0.0075	0.0313	18.031
0.0943	0.0002	0.0001	0.0004	0.09481	1.83128	0.0260442	0.00002	3E-05	0.0038344	0.0034	0.0075	0.03174	15.6572
0.1071	0.0002	0.0001	0.0004	0.1076	1.77099	0.0264831	0.00002	3E-05	0.0041356	0.0034	0.0075	0.03225	13.6911
0.1122	0.0003	0.0001	0.0004	0.11268	1.61177	0.0267335	0.00002	3E-05	0.0045331	0.0034	0.0075	0.03267	11.5505
0.1159	0.0003	0.0001	0.0004	0.11635	1.52891	0.0267335	0.00002	3E-05	0.004985	0.0034	0.0075	0.03293	9.62777
0.1414	0.0003	0.0001	0.0004	0.14177	1.62431	0.0273012	0.00002	3E-05	0.0055494	0.0034	0.0075	0.03375	7.97397
0.1537	0.0003	0.0001	0.0004	0.15404	1.46956	0.0276211	0.00002	3E-05	0.0062578	0.0034	0.0075	0.0345	6.4139
UdT77	UVR/NR	UVH/VH	Ud/k	UNu/Nu	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Std	1.25	L (m)		0.65		PR	epsilon	X	h^2	Rs	phi	
		f (Hz)	Vmfc (mV)	VR (V)	VH (V)							
1	676	864	0.09376	5.59603	29.5	23.3	6.2	26.4	0.026112	6.787	346.928	
2	676	1011	0.10938	6.52809	30.6	23.3	7.3	26.95	0.026152	7.8123	347.247	
3	676	1139	0.12504	7.46296	31.2	23.3	7.9	27.25	0.026174	9.4509	347.42	
4	676	1272	0.14071	8.39822	31.5	23.3	8.2	27.4	0.026185	11.525	347.507	
5	676	1235	0.15640	9.33432	33.3	23.3	10	28.3	0.026251	11.646	348.027	
6	676	1348	0.17201	10.26621	33.7	23.2	10.5	28.45	0.026262	13.411	348.113	
7	676	1438	0.18772	11.20410	33.8	23.3	10.5	28.55	0.026269	15.989	348.171	
8	676	1529	0.20333	12.13567	34.1	23.4	10.7	28.75	0.026284	18.374	348.286	
9	676	2456	0.20333	12.13567	29.6	23.1	6.5	26.35	0.026108	30.45	346.899	
10	676	2556	0.21652	12.92270	30	23.1	6.9	26.55	0.026123	32.658	347.015	
11	676	1519	0.14879	8.88025	28.5	22.9	5.6	25.7	0.026061	18.959	346.523	
12	676	1629	0.15682	9.35533	28.5	22.9	5.6	25.7	0.026061	21.06	346.523	
13	676	1749	0.16483	9.82595	28.5	22.9	5.6	25.7	0.026061	23.212	346.523	
14	676	1878	0.17225	10.28055	28.6	22.9	5.7	25.75	0.026065	24.961	346.552	
15	676	1968	0.18007	10.74730	28.7	22.9	5.8	25.8	0.026068	26.805	346.581	
16	676	2036	0.18790	11.21430	29.2	22.9	6.3	26.05	0.026087	28.95	346.725	
17	676	2141	0.19573	11.68170	29.2	22.8	6.4	26	0.026083	28.683	346.697	
18	676	2326	0.20415	12.18420	29.4	22.8	6.6	26.1	0.02609	30.26	346.754	
19	676	2265	0.20415	12.18420	29.7	22.8	6.9	26.25	0.026101	28.922	346.841	
20	676	2454	0.21136	12.61460	29.9	22.8	7.1	26.35	0.026108	30.12	346.899	
#		f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)
												v (m^2/s)
												PR
												epsilon
												X
												h^2
												Rs
												phi

UdTTT	UVR/VR	UVH/H	Uk/k	UNu/Unu	UNu	UTavg/Tavg	Uff	Uw/v	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs
0.114	0.0003	0.0001	0.0004	0.11449	0.77702	0.0267841	0.00002	3E-05	0.0005787	0.0034	0.0075	0.03349	4.11714
0.0959	0.0003	0.0001	0.0004	0.09738	0.76271	0.0262375	0.00002	3E-05	0.00049456	0.0034	0.0075	0.03251	5.46355
0.0895	0.0003	0.0001	0.0004	0.08007	0.8512	0.0259486	0.00002	3E-05	0.00043988	0.0034	0.0075	0.03195	6.81077
0.0852	0.0003	0.0001	0.0004	0.08681	1.00054	0.0258066	0.00002	3E-05	0.00049308	0.0034	0.0075	0.03159	8.39632
0.0707	0.0002	0.0001	0.0004	0.07142	0.8317	0.0249859	0.00002	3E-05	0.00040486	0.0034	0.0075	0.03099	7.74534
0.0673	0.0002	0.0001	0.0004	0.06808	0.91307	0.0248641	0.00002	3E-05	0.00037092	0.0034	0.0075	0.03071	9.14155
0.0673	0.0002	0.0001	0.0004	0.06808	1.08721	0.0247671	0.00002	3E-05	0.00034771	0.0034	0.0075	0.03053	10.33936
0.0661	0.0002	0.0001	0.0004	0.06684	1.22812	0.0245946	0.00002	3E-05	0.00032701	0.0034	0.0075	0.03033	11.595
0.1088	0.0002	0.0001	0.0004	0.10924	3.32647	0.0268349	0.00002	3E-05	0.00020358	0.0034	0.0075	0.03174	31.526
0.1025	0.0002	0.0001	0.0004	0.10297	3.34719	0.0266532	0.00002	3E-05	0.00019562	0.0034	0.0075	0.03154	33.9227
0.1263	0.0003	0.0001	0.0004	0.12686	2.40147	0.0275136	0.00002	3E-05	0.0002916	0.0034	0.0075	0.03272	12.4555
0.1263	0.0002	0.0001	0.0004	0.12666	2.56757	0.0275136	0.00002	3E-05	0.00030654	0.0034	0.0075	0.03264	14.28638
0.1263	0.0002	0.0001	0.0004	0.12666	2.9402	0.0275136	0.00002	3E-05	0.00028568	0.0034	0.0075	0.03256	16.4306
0.1241	0.0002	0.0001	0.0004	0.12446	3.10652	0.0274602	0.00002	3E-05	0.00026624	0.0034	0.0075	0.03245	18.8762
0.1219	0.0002	0.0001	0.0004	0.12232	3.27866	0.027407	0.00002	3E-05	0.00025407	0.0034	0.0075	0.03236	20.6723
0.1122	0.0002	0.0001	0.0004	0.11268	3.02552	0.027144	0.00002	3E-05	0.00024658	0.0034	0.0075	0.03211	21.9414
0.1105	0.0002	0.0001	0.0004	0.11094	3.18204	0.0271962	0.00002	3E-05	0.00023354	0.0034	0.0075	0.03212	24.2722
0.1071	0.0002	0.0001	0.0004	0.1076	3.25499	0.027092	0.00002	3E-05	0.00021486	0.0034	0.0075	0.03198	28.5156
0.1025	0.0002	0.0001	0.0004	0.10297	2.97805	0.0268371	0.00002	3E-05	0.00022075	0.0034	0.0075	0.03187	26.9318
0.0986	0.0002	0.0001	0.0004	0.10009	3.01485	0.0268349	0.00002	3E-05	0.00020375	0.0034	0.0075	0.03174	31.4751
UdTTT	UVR/VR	UVH/H	Uk/k	UNu/Unu	UNu	UTavg/Tavg	Uff	Uw/v	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs

UdTTT	UVR/VR	UVH/H	Uk/k	UNu/Unu	UNu
0.114	0.0003	0.0001	0.0004	0.11449	0.77702
0.0959	0.0003	0.0001	0.0004	0.09738	0.76271
0.0895	0.0003	0.0001	0.0004	0.08007	0.8512
0.0852	0.0003	0.0001	0.0004	0.08681	1.00054
0.0707	0.0002	0.0001	0.0004	0.07142	0.8317
0.0673	0.0002	0.0001	0.0004	0.06808	0.91307
0.0673	0.0002	0.0001	0.0004	0.06808	1.08721
0.0661	0.0002	0.0001	0.0004	0.06684	1.22812
0.1088	0.0002	0.0001	0.0004	0.10924	3.32647
0.1025	0.0002	0.0001	0.0004	0.10297	3.34719
0.1263	0.0003	0.0001	0.0004	0.12686	2.40147
0.1263	0.0002	0.0001	0.0004	0.12666	2.56757
0.1263	0.0002	0.0001	0.0004	0.12666	2.9402
0.1241	0.0002	0.0001	0.0004	0.12446	3.10652
0.1219	0.0002	0.0001	0.0004	0.12232	3.27866
0.1122	0.0002	0.0001	0.0004	0.11268	3.02552
0.1105	0.0002	0.0001	0.0004	0.11094	3.18204
0.1071	0.0002	0.0001	0.0004	0.1076	3.25499
0.1025	0.0002	0.0001	0.0004	0.10297	2.97805
0.0986	0.0002	0.0001	0.0004	0.10009	3.01485

Std	1.25	L (m)		0.60000		TH (C)	TA(C)	deltaT(C)	Tang (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	n^2	Rs	phi	
		#	f (Hz)	Vmic (mV)	VR (V)															
		1	723	865	0.09387	5.60247	28.6	22.9	5.7	25.75	0.026065	7.4128	346.552	1.56E-05	0.01156	0.19845	0.042	2830	115.19	0.458
		2	723	1037	0.10972	6.54870	28.9	22.9	6	25.9	0.026076	9.6178	346.639	1.56E-05	0.01386	0.23797	0.042	2928	165.78	0.457
		3	723	1142	0.12526	7.47588	29.4	23	6.4	26.2	0.026098	11.741	346.812	1.57E-05	0.01527	0.26219	0.042	2922	200.9	0.457
		4	723	1244	0.14070	8.39748	29.6	22.9	6.7	26.25	0.026101	14.149	346.841	1.57E-05	0.01663	0.28864	0.042	2921	238.38	0.456
		5	723	1334	0.15638	9.33320	29.6	22.8	6.8	26.2	0.026098	17.223	346.812	1.57E-05	0.01783	0.30827	0.042	2922	274.13	0.457
		6	723	1449	0.17206	10.26894	29.7	22.6	7.1	26.15	0.026094	19.971	346.783	1.57E-05	0.01937	0.33265	0.042	2923	323.47	0.457
		7	723	1548	0.18770	11.20239	30.2	22.6	7.6	26.4	0.026112	22.188	346.928	1.57E-05	0.02069	0.35553	0.042	2919	368.95	0.456
		8	723	1645	0.20395	12.17259	31	22.5	8.5	26.75	0.026138	23.401	347.131	1.57E-05	0.02199	0.37802	0.042	2913	416.38	0.455
		9	723	1757	0.21899	13.06987	31.3	22.6	8.7	26.95	0.026152	26.343	347.247	1.57E-05	0.02349	0.4039	0.042	2909	474.63	0.455
		10	723	1848	0.23445	13.99278	31.6	22.6	9	27.1	0.026163	29.176	347.333	1.58E-05	0.0247	0.42492	0.042	2907	524.16	0.454
		11	723	1943	0.23445	13.99278	31.3	22.6	8.7	26.95	0.026152	30.195	347.247	1.57E-05	0.02587	0.44685	0.042	2909	580.43	0.455
		12	723	2049	0.23445	13.99278	31.2	22.6	8.6	26.9	0.026149	30.355	347.218	1.57E-05	0.02739	0.47098	0.042	2910	645.38	0.455
		13	723	2123	0.23857	14.23870	31.4	22.4	9	26.9	0.026149	30.227	347.218	1.57E-05	0.02838	0.48799	0.042	2910	693.05	0.455
		14	723	950	0.08642	5.15258	27.3	22.4	4.9	24.85	0.025999	7.3264	346.929	1.55E-05	0.0127	0.21762	0.042	2846	139.51	0.46
		15	723	1034	0.10165	6.06709	27.6	22.4	5.2	25	0.02601	9.5493	346.117	1.56E-05	0.01382	0.23692	0.042	2943	165.21	0.46
		16	723	1170	0.11709	6.98853	28	22.4	5.6	25.2	0.026024	11.769	346.233	1.56E-05	0.01564	0.26617	0.042	2940	211.41	0.459
		17	723	2231	0.24909	14.86632	31.8	22.4	9.4	27.1	0.026163	31.631	347.333	1.58E-05	0.02982	0.51299	0.042	2907	764.98	0.454
		18	723	1234	0.13337	7.95984	28.5	22.4	6.1	25.45	0.026043	13.894	346.378	1.56E-05	0.01665	0.28296	0.042	2935	235.12	0.459
		19	723	1377	0.14881	8.88133	28.3	22.4	5.9	25.35	0.026035	18.017	346.32	1.56E-05	0.01841	0.3157	0.042	2937	292.73	0.459
		20	723	1448	0.16485	9.83909	28.8	22.4	6.4	25.6	0.026054	20.371	346.465	1.56E-05	0.01936	0.33211	0.042	2933	323.48	0.458
		#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tang (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	n^2	Rs	phi

UdTT	UVR/NR	UVf/N/H	Uk/k	UNu/UNu	UNu/UNu	UTavg/UTavg	Ufff	Uuvv	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1241	0.0003	0.0001	0.0004	0.12446	0.92257	0.0274602	0.00002	3E-05	0.0057693	0.0034	0.0075	0.03403	3.92701
0.1179	0.0003	0.0001	0.0004	0.11827	1.13754	0.0273012	0.00002	3E-05	0.0048216	0.0034	0.0075	0.0333	5.52027
0.1105	0.0003	0.0001	0.0004	0.11094	1.30249	0.0269885	0.00002	3E-05	0.0043783	0.0034	0.0075	0.03279	6.58842
0.1065	0.0003	0.0001	0.0004	0.10601	1.49992	0.0269371	0.00002	3E-05	0.0040193	0.0034	0.0075	0.03257	7.76281
0.104	0.0002	0.0001	0.0004	0.10447	1.75921	0.0269885	0.00002	3E-05	0.0037481	0.0034	0.0075	0.03248	8.904
0.0986	0.0002	0.0001	0.0004	0.10009	1.999	0.0270402	0.00002	3E-05	0.0034507	0.0034	0.0075	0.03239	10.47779
0.093	0.0002	0.0001	0.0004	0.09358	2.07628	0.0267841	0.00002	3E-05	0.0032323	0.0034	0.0075	0.03209	11.8383
0.0832	0.0002	0.0001	0.0004	0.08379	1.96073	0.0264336	0.00002	3E-05	0.0030395	0.0034	0.0075	0.03172	13.2035
0.0813	0.0002	0.0001	0.0004	0.08189	2.15724	0.0262375	0.00002	3E-05	0.0028458	0.0034	0.0075	0.03148	14.9431
0.0786	0.0002	0.0001	0.0004	0.0792	2.31081	0.0260923	0.00002	3E-05	0.0027056	0.0034	0.0075	0.03131	16.4352
0.0813	0.0002	0.0001	0.0004	0.08189	2.47266	0.0262375	0.00002	3E-05	0.0025733	0.0034	0.0075	0.03139	18.2199
0.0842	0.0002	0.0001	0.0004	0.08283	2.53042	0.0262862	0.00002	3E-05	0.0024402	0.0034	0.0075	0.03139	20.2636
0.0786	0.0002	0.0001	0.0004	0.0792	2.39408	0.0262862	0.00002	3E-05	0.0023552	0.0034	0.0075	0.03136	21.7356
0.1443	0.0003	0.0001	0.0004	0.14465	1.05979	0.0284547	0.00002	3E-05	0.0026232	0.0034	0.0075	0.03451	4.8144
0.136	0.0003	0.0001	0.0004	0.13635	1.36204	0.028284	0.00002	3E-05	0.0028356	0.0034	0.0075	0.03412	5.63632
0.1263	0.0003	0.0001	0.0004	0.12666	1.48939	0.0280595	0.00002	3E-05	0.0027735	0.0034	0.0075	0.03363	7.10939
0.0752	0.0002	0.0001	0.0004	0.07589	2.39281	0.0269323	0.00002	3E-05	0.0022411	0.0034	0.0075	0.03117	23.8411
0.1159	0.0003	0.0001	0.0004	0.11635	1.62821	0.0277839	0.00002	3E-05	0.0040519	0.0034	0.0075	0.03329	7.82336
0.1198	0.0003	0.0001	0.0004	0.12027	2.16686	0.0278535	0.00002	3E-05	0.0036311	0.0034	0.0075	0.03318	9.71405
0.1105	0.0002	0.0001	0.0004	0.11094	2.25891	0.0276211	0.00002	3E-05	0.003453	0.0034	0.0075	0.03288	10.6359
UdTT	UVR/NR	UVf/N/H	Uk/k	UNu/UNu	UNu/UNu	UTavg/UTavg	Ufff	Uuvv	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

UdTT	UVR/NR	UVf/N/H	Uk/k	UNu/UNu	UNu/UNu	UTavg/UTavg	Ufff	Uuvv	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1241	0.0003	0.0001	0.0004	0.12446	0.92257	0.0274602	0.00002	3E-05	0.0057693	0.0034	0.0075	0.03403	3.92701
0.1179	0.0003	0.0001	0.0004	0.11827	1.13754	0.0273012	0.00002	3E-05	0.0048216	0.0034	0.0075	0.0333	5.52027
0.1105	0.0003	0.0001	0.0004	0.11094	1.30249	0.0269885	0.00002	3E-05	0.0043783	0.0034	0.0075	0.03279	6.58842
0.1065	0.0003	0.0001	0.0004	0.10601	1.49992	0.0269371	0.00002	3E-05	0.0040193	0.0034	0.0075	0.03257	7.76281
0.104	0.0002	0.0001	0.0004	0.10447	1.75921	0.0269885	0.00002	3E-05	0.0037481	0.0034	0.0075	0.03248	8.904
0.0986	0.0002	0.0001	0.0004	0.10009	1.999	0.0270402	0.00002	3E-05	0.0034507	0.0034	0.0075	0.03239	10.47779
0.093	0.0002	0.0001	0.0004	0.09358	2.07628	0.0267841	0.00002	3E-05	0.0032323	0.0034	0.0075	0.03209	11.8383
0.0832	0.0002	0.0001	0.0004	0.08379	1.96073	0.0264336	0.00002	3E-05	0.0030395	0.0034	0.0075	0.03172	13.2035
0.0813	0.0002	0.0001	0.0004	0.08189	2.15724	0.0262375	0.00002	3E-05	0.0028458	0.0034	0.0075	0.03148	14.9431
0.0786	0.0002	0.0001	0.0004	0.0792	2.31081	0.0260923	0.00002	3E-05	0.0027056	0.0034	0.0075	0.03131	16.4352
0.0813	0.0002	0.0001	0.0004	0.08189	2.47266	0.0262375	0.00002	3E-05	0.0025733	0.0034	0.0075	0.03139	18.2199
0.0842	0.0002	0.0001	0.0004	0.08283	2.53042	0.0262862	0.00002	3E-05	0.0024402	0.0034	0.0075	0.03139	20.2636
0.0786	0.0002	0.0001	0.0004	0.0792	2.39408	0.0262862	0.00002	3E-05	0.0023552	0.0034	0.0075	0.03136	21.7356
0.1443	0.0003	0.0001	0.0004	0.14465	1.05979	0.0284547	0.00002	3E-05	0.0026232	0.0034	0.0075	0.03451	4.8144
0.136	0.0003	0.0001	0.0004	0.13635	1.36204	0.028284	0.00002	3E-05	0.0028356	0.0034	0.0075	0.03412	5.63632
0.1263	0.0003	0.0001	0.0004	0.12666	1.48939	0.0280595	0.00002	3E-05	0.0027735	0.0034	0.0075	0.03363	7.10939
0.0752	0.0002	0.0001	0.0004	0.07589	2.39281	0.0269323	0.00002	3E-05	0.0022411	0.0034	0.0075	0.03117	23.8411
0.1159	0.0003	0.0001	0.0004	0.11635	1.62821	0.0277839	0.00002	3E-05	0.0040519	0.0034	0.0075	0.03329	7.82336
0.1198	0.0003	0.0001	0.0004	0.12027	2.16686	0.0278535	0.00002	3E-05	0.0036311	0.0034	0.0075	0.03318	9.71405
0.1105	0.0002	0.0001	0.0004	0.11094	2.25891	0.0276211	0.00002	3E-05	0.003453	0.0034	0.0075	0.03288	10.6359
UdTT	UVR/NR	UVf/N/H	Uk/k	UNu/UNu	UNu/UNu	UTavg/UTavg	Ufff	Uuvv	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Sud 125		L [m]		0.65000														
#	f [Hz]	Vmic [mV]	VR [V]	VH [V]	TH [C]	TA[C]	deltaT[C]	Tavg [C]	k[W/mK]	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	lambda^2	Rs	phi
1	925	557	0.06242	3.72936	26.2	22.3	3.9	24.25	0.02955	4.8106	345.981	1.55E-05	0.00745	0.0963	0.053	3/82	37.544	0.591
2	925	656	0.07898	4.66005	27.4	22.3	5.1	24.85	0.02999	5.466	346.029	1.55E-05	0.00877	0.11746	0.053	3/69	51.995	0.589
3	925	766	0.09376	5.59568	28	22.3	5.7	25.15	0.028021	7.4073	346.204	1.56E-05	0.01024	0.13722	0.053	3/62	70.839	0.588
4	925	955	0.12551	7.49117	30.7	22.2	8.5	26.45	0.026116	8.8701	346.957	1.57E-05	0.01277	0.17145	0.053	3/73	108.74	0.583
5	925	1064	0.14116	8.4291	32	22.3	9.7	27.15	0.026167	9.812	347.362	1.58E-05	0.01422	0.19124	0.053	3/18	135.98	0.581
6	925	1166	0.15650	9.34630	33.1	22.3	10.8	27.7	0.026207	10.828	347.68	1.58E-05	0.01559	0.20977	0.053	3/76	163.07	0.579
7	925	872	0.10945	6.53227	29.3	22.2	7.1	25.75	0.026065	8.0904	346.552	1.56E-05	0.01166	0.15837	0.053	3/49	91.639	0.586
8	925	1240	0.17203	10.26723	34.5	22.5	12	28.5	0.026265	11.735	348.142	1.59E-05	0.01658	0.22338	0.053	3/69	184.05	0.576
9	925	1367	0.18809	11.22584	34.8	22.7	12.1	28.75	0.026284	13.903	348.286	1.59E-05	0.01827	0.24636	0.053	3/63	223.64	0.575
10	925	1454	0.20312	12.12320	35.3	22.6	12.7	28.95	0.026298	15.44	348.402	1.59E-05	0.01944	0.26212	0.053	3/79	252.77	0.575
11	925	1574	0.22023	13.14390	35.4	22.8	12.6	29.1	0.026309	16.295	348.468	1.59E-05	0.02104	0.28382	0.053	3/76	286.1	0.574
12	925	1646	0.23445	13.99280	35.6	23	12.6	29.3	0.026324	20.713	348.604	1.6E-05	0.022	0.29691	0.053	3/71	323.94	0.574
13	925	1756	0.25093	14.97640	35.2	23.1	12.1	29.15	0.026313	24.718	348.517	1.59E-05	0.02347	0.31667	0.053	3/75	368.48	0.574
14	925	1850	0.25093	14.97640	34.1	23.1	11	28.6	0.026273	27.231	348.2	1.59E-05	0.02473	0.33332	0.053	3/66	408.36	0.576
15	925	1959	0.25093	14.97640	33.4	23.1	10.3	28.25	0.026247	29.11	347.998	1.59E-05	0.02632	0.35455	0.053	3/64	464.38	0.577
16	925	2051	0.25093	14.97640	33.4	23.2	10.2	28.3	0.026251	29.392	348.027	1.59E-05	0.02742	0.36335	0.053	3/63	503.78	0.577
17	925	1403	0.16484	9.83843	33	23.3	9.7	28.15	0.02624	13.343	347.94	1.59E-05	0.01875	0.25259	0.053	3/66	235.82	0.578
18	925	1630	0.18007	10.74749	32.2	23.3	8.9	27.75	0.02621	17.314	347.709	1.58E-05	0.02179	0.29227	0.053	3/05	318.83	0.579
19	925	1721	0.19511	11.64467	32.1	23.3	8.8	27.7	0.026207	20.63	347.68	1.58E-05	0.02301	0.30561	0.053	3/06	355.25	0.579
20	925	1838	0.21055	12.56663	31.9	23.4	8.5	27.65	0.026203	24.818	347.851	1.58E-05	0.02457	0.33063	0.053	3/07	405.25	0.579
#	f [Hz]	Vmic [mV]	VR [V]	VH [V]	TH [C]	TA[C]	deltaT[C]	Tavg [C]	k[W/mK]	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	lambda^2	Rs	phi

Ud/T/T	UVR/V/R	UVH/V/H	Uk/k	UNu/NU	UNu	UTavg/Tavg	U/T/T	U/v/v	Uvmic/Vmic	U/G/G	U/S/S	U/Rs/Rs	URs
0.1813	0.0003	0.0001	0.0004	0.18158	0.67354	0.02915683	0.00002	3E-05	0.0009767	0.0034	0.0075	0.03799	1.42616
0.1386	0.0003	0.0001	0.0004	0.138901	0.798882	0.0284547	0.00002	3E-05	0.007622	0.0034	0.0075	0.03623	1.88388
0.1241	0.0003	0.0001	0.0004	0.12446	0.92189	0.0281153	0.00002	3E-05	0.0065274	0.0034	0.0075	0.03509	2.48577
0.0832	0.0003	0.0001	0.0004	0.08379	0.74322	0.0267335	0.00002	3E-05	0.0052356	0.0034	0.0075	0.03309	3.63102
0.0729	0.0003	0.0001	0.0004	0.07358	0.72199	0.0260442	0.00002	3E-05	0.0046982	0.0034	0.0075	0.0322	4.37896
0.0655	0.0002	0.0001	0.0004	0.066523	0.71725	0.0255271	0.00002	3E-05	0.0042882	0.0034	0.0075	0.03155	5.14538
0.0986	0.0003	0.0001	0.0004	0.10009	0.80998	0.0274602	0.00002	3E-05	0.0057339	0.0034	0.0075	0.034	3.11643
0.0589	0.0002	0.0001	0.0004	0.058977	0.70142	0.0248105	0.00002	3E-05	0.0040323	0.0034	0.0075	0.03084	5.67584
0.0584	0.0002	0.0001	0.0004	0.058929	0.82433	0.0245948	0.00002	3E-05	0.0036576	0.0034	0.0075	0.03048	6.81276
0.0557	0.0002	0.0001	0.0004	0.058657	0.87347	0.0244249	0.00002	3E-05	0.0034386	0.0034	0.0075	0.03024	7.64307
0.0561	0.0002	0.0001	0.0004	0.05701	1.04242	0.024299	0.00002	3E-05	0.0031766	0.0034	0.0075	0.03002	8.88907
0.0561	0.0002	0.0001	0.0004	0.05701	1.18077	0.02441331	0.00002	3E-05	0.0030377	0.0034	0.0075	0.029983	9.65386
0.0584	0.0002	0.0001	0.0004	0.05929	1.46554	0.0242573	0.00002	3E-05	0.0028474	0.0034	0.0075	0.02985	11.0098
0.0643	0.0002	0.0001	0.0004	0.06606	1.7716	0.0247233	0.00002	3E-05	0.0027027	0.0034	0.0075	0.03018	12.3612
0.0687	0.0002	0.0001	0.0004	0.06838	2.01959	0.0250301	0.00002	3E-05	0.0025394	0.0034	0.0075	0.03038	14.1057
0.0693	0.0002	0.0001	0.0004	0.07004	2.05869	0.0249859	0.00002	3E-05	0.0024378	0.0034	0.0075	0.03031	15.238
0.0729	0.0002	0.0001	0.0004	0.07358	0.98184	0.025119	0.00002	3E-05	0.0035638	0.0034	0.0075	0.03086	7.27705
0.0746	0.0002	0.0001	0.0004	0.08606	1.39127	0.0254811	0.00002	3E-05	0.0030675	0.0034	0.0075	0.03094	9.85896
0.0804	0.0002	0.0001	0.0004	0.08097	1.67052	0.0255271	0.00002	3E-05	0.0028053	0.0034	0.0075	0.03092	10.9831
0.0832	0.0002	0.0001	0.0004	0.08379	2.08449	0.0255732	0.00002	3E-05	0.0027293	0.0034	0.0075	0.03089	12.517
Ud/T/T	UVR/V/R	UVH/V/H	Uk/k	UNu/NU	UNu	Ufavg/Tavg	U/T/T	U/v/v	Uvmic/Vmic	U/G/G	U/S/S	U/Rs/Rs	URs

Ud/T/T	UVR/V/R	UVH/V/H	Uk/k	UNu/NU	UNu	UTavg/Tavg	U/T/T	U/v/v	Uvmic/Vmic	U/G/G	U/S/S	U/Rs/Rs	URs
0.1813	0.0003	0.0001	0.0004	0.18158	0.67354	0.02915683	0.00002	3E-05	0.0009767	0.0034	0.0075	0.03799	1.42616
0.1386	0.0003	0.0001	0.0004	0.138901	0.798882	0.0284547	0.00002	3E-05	0.007622	0.0034	0.0075	0.03623	1.88388
0.1241	0.0003	0.0001	0.0004	0.12446	0.92189	0.0281153	0.00002	3E-05	0.0065274	0.0034	0.0075	0.03509	2.48577
0.0832	0.0003	0.0001	0.0004	0.08379	0.74322	0.0267335	0.00002	3E-05	0.0052356	0.0034	0.0075	0.03309	3.63102
0.0729	0.0003	0.0001	0.0004	0.07358	0.72199	0.0260442	0.00002	3E-05	0.0046982	0.0034	0.0075	0.0322	4.37896
0.0655	0.0002	0.0001	0.0004	0.066523	0.71725	0.0255271	0.00002	3E-05	0.0042882	0.0034	0.0075	0.03155	5.14538
0.0986	0.0003	0.0001	0.0004	0.10009	0.80998	0.0274602	0.00002	3E-05	0.0057339	0.0034	0.0075	0.034	3.11643
0.0589	0.0002	0.0001	0.0004	0.058977	0.70142	0.0248105	0.00002	3E-05	0.0040323	0.0034	0.0075	0.03084	5.67584
0.0584	0.0002	0.0001	0.0004	0.058929	0.82433	0.0245948	0.00002	3E-05	0.0036576	0.0034	0.0075	0.03048	6.81276
0.0557	0.0002	0.0001	0.0004	0.058657	0.87347	0.0244249	0.00002	3E-05	0.0034386	0.0034	0.0075	0.03024	7.64307
0.0561	0.0002	0.0001	0.0004	0.05701	1.04242	0.024299	0.00002	3E-05	0.0031766	0.0034	0.0075	0.03002	8.88907
0.0561	0.0002	0.0001	0.0004	0.05701	1.18077	0.02441331	0.00002	3E-05	0.0030377	0.0034	0.0075	0.029983	9.65386
0.0584	0.0002	0.0001	0.0004	0.05929	1.46554	0.0242573	0.00002	3E-05	0.0028474	0.0034	0.0075	0.02985	11.0098
0.0643	0.0002	0.0001	0.0004	0.06606	1.7716	0.0247233	0.00002	3E-05	0.0027027	0.0034	0.0075	0.03018	12.3612
0.0687	0.0002	0.0001	0.0004	0.06838	2.01959	0.0250301	0.00002	3E-05	0.0025394	0.0034	0.0075	0.03038	14.1057
0.0693	0.0002	0.0001	0.0004	0.07004	2.05869	0.0249859	0.00002	3E-05	0.0024378	0.0034	0.0075	0.03031	15.238
0.0729	0.0002	0.0001	0.0004	0.07358	0.98184	0.025119	0.00002	3E-05	0.0035638	0.0034	0.0075	0.03086	7.27705
0.0746	0.0002	0.0001	0.0004	0.08606	1.39127	0.0254811	0.00002	3E-05	0.0030675	0.0034	0.0075	0.03094	9.85896
0.0804	0.0002	0.0001	0.0004	0.08097	1.67052	0.0255271	0.00002	3E-05	0.0028053	0.0034	0.0075	0.03092	10.9831
0.0832	0.0002	0.0001	0.0004	0.08379	2.08449	0.0255732	0.00002	3E-05	0.0027293	0.0034	0.0075	0.03089	12.517
Ud/T/T	UVR/V/R	UVH/V/H	Uk/k	UNu/NU	UNu	UTavg/Tavg	U/T/T	U/v/v	Uvmic/Vmic	U/G/G	U/S/S	U/Rs/Rs	URs

S04		1.25		L (m)		0.65000																
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R <sub>s</sub>	phi				
1	1202	502	0.07809	4.66081	30.4	24	6.4	27.2	0.026171	4.5507	347.391	1.58E-05	0.00671	0.06944	0.069	4830	23.29	0.755				
2	1202	554	0.08600	5.13299	31.1	24	7.1	27.55	0.026196	4.9705	347.594	1.58E-05	0.00741	0.07668	0.069	4820	28.34	0.753				
3	1202	601	0.09396	5.60186	31.6	24.1	7.5	27.85	0.026218	5.5996	347.767	1.58E-05	0.00803	0.08323	0.069	4811	33.327	0.752				
4	1202	650	0.10168	6.06882	32.2	24.2	8	28.2	0.026244	6.1653	347.969	1.59E-05	0.00869	0.09006	0.069	4802	38.948	0.75				
5	1202	704	0.10951	6.53988	32.8	24.2	8.6	28.5	0.026265	6.6336	348.142	1.59E-05	0.00941	0.09759	0.069	4793	45.693	0.749				
6	1202	749	0.11735	7.00370	33.6	24.2	9.4	28.9	0.026295	6.9833	348.373	1.59E-05	0.01001	0.1039	0.069	4782	51.623	0.747				
7	1202	800	0.12506	7.46402	34.2	24.3	9.9	29.25	0.02632	7.502	348.575	1.6E-05	0.01069	0.1104	0.069	4772	58.841	0.746				
8	1202	903	0.13289	7.93145	34	24.3	9.7	29.15	0.026313	8.6481	348.517	1.59E-05	0.01207	0.12532	0.069	4775	74.908	0.746				
9	1202	949	0.14085	8.40668	34.3	24.2	10.1	29.25	0.02632	9.3281	348.575	1.6E-05	0.01269	0.13172	0.069	4772	82.8	0.746				
10	1202	998	0.14874	8.87754	34.9	24.2	10.7	29.55	0.026342	9.8108	348.748	1.6E-05	0.01334	0.13859	0.069	4764	91.501	0.744				
11	1202	1048	0.15656	9.34395	35.1	23.9	11.2	29.5	0.026338	10.305	348.719	1.6E-05	0.01401	0.14552	0.069	4765	100.81	0.745				
12	1202	1101	0.16428	9.80463	36.9	24	12.9	30.45	0.026407	9.9105	349.286	1.61E-05	0.01472	0.15312	0.069	4739	111.11	0.74				
13	1202	1148	0.17205	10.26875	37.4	24	13.4	30.7	0.026426	10.449	349.409	1.61E-05	0.01535	0.15972	0.069	4732	120.22	0.739				
14	1202	1200	0.17992	10.73818	38.6	24	14.6	31.3	0.026469	10.489	349.754	1.61E-05	0.01604	0.16712	0.069	4716	131.71	0.737				
15	1202	1247	0.18774	11.20505	39.7	24.1	15.6	31.9	0.026513	10.651	350.099	1.62E-05	0.01687	0.17584	0.068	4699	142.01	0.734				
16	1202	1300	0.19547	11.66550	39.8	24.1	15.7	31.95	0.026516	11.471	350.127	1.62E-05	0.01738	0.18124	0.068	4698	154.12	0.734				
17	1202	1655	0.20330	12.13950	40.4	24.1	16.3	32.25	0.026538	11.942	350.299	1.62E-05	0.02212	0.23085	0.068	4690	249.93	0.733				
18	1202	1405	0.20151	12.02710	40.7	24.2	16.5	32.45	0.026553	11.585	350.414	1.63E-05	0.01818	0.19804	0.068	4684	180.03	0.732				
19	1202	1448	0.21956	13.10400	41.7	24.3	17.4	33	0.026592	13.021	350.729	1.63E-05	0.01936	0.20223	0.068	4669	190.96	0.73				
20	1202	1504	0.22719	13.55980	42.4	24.3	18.1	33.35	0.026618	13.391	350.93	1.63E-05	0.0201	0.21017	0.068	4660	205.84	0.728				
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R <sub>s</sub>	phi				

Ud177	UVR/NR	UVi/NH	Uk/k	UNu/NU	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1105	0.00031	0.0001	0.0004	0.11094	0.50485	0.0259963	0.00002	3E-05	0.0089602	0.0034	0.0075	0.03655	0.85553
0.0996	0.0003	0.0001	0.0004	0.10009	0.49751	0.0256661	0.00002	3E-05	0.00890253	0.0034	0.0075	0.03543	1.00397
0.0943	0.0003	0.0001	0.0004	0.09481	0.15309	0.0253896	0.00002	3E-05	0.0083195	0.0034	0.0075	0.03452	1.15058
0.0884	0.0003	0.0001	0.0004	0.08895	0.54753	0.0250745	0.00002	3E-05	0.0076923	0.0034	0.0075	0.0337	1.31264
0.0822	0.0003	0.0001	0.0004	0.08283	0.54982	0.0248105	0.00002	3E-05	0.0071023	0.0034	0.0075	0.03298	1.50577
0.0752	0.0003	0.0001	0.0004	0.07589	0.53842	0.02444671	0.00002	3E-05	0.0066756	0.0034	0.0075	0.03236	1.67067
0.0714	0.0003	0.0001	0.0004	0.07212	0.54107	0.0241744	0.00002	3E-05	0.00625	0.0034	0.0075	0.0318	1.871
0.0729	0.0003	0.0001	0.0004	0.07353	0.63634	0.0242573	0.00002	3E-05	0.0055371	0.0034	0.0075	0.03133	2.34924
0.07	0.0003	0.0001	0.0004	0.07072	0.65971	0.0241744	0.00002	3E-05	0.0052687	0.0034	0.0075	0.03108	2.57331
0.0661	0.0003	0.0001	0.0004	0.06684	0.65575	0.0239289	0.00002	3E-05	0.00501	0.0034	0.0075	0.03072	2.81051
0.0631	0.0002	0.0001	0.0004	0.06392	0.66385	0.0239695	0.00002	3E-05	0.004771	0.0034	0.0075	0.03059	3.08738
0.0548	0.0002	0.0001	0.0004	0.05572	0.55173	0.0232217	0.00002	3E-05	0.0045413	0.0034	0.0075	0.02987	3.31681
0.0528	0.0002	0.0001	0.0004	0.05371	0.56112	0.0230326	0.00002	3E-05	0.0043554	0.0034	0.0075	0.02961	3.57475
0.0484	0.0002	0.0001	0.0004	0.04946	0.51778	0.0225911	0.00002	3E-05	0.0041687	0.0034	0.0075	0.02916	3.84048
0.0453	0.0002	0.0001	0.0004	0.04642	0.49444	0.0221661	0.00002	3E-05	0.0040056	0.0034	0.0075	0.02874	4.08172
0.045	0.0002	0.0001	0.0004	0.04614	0.52928	0.0221315	0.00002	3E-05	0.0038462	0.0034	0.0075	0.02863	4.41755
0.0434	0.0002	0.0001	0.0004	0.04452	0.53167	0.0219256	0.00002	3E-05	0.0030211	0.0034	0.0075	0.02807	7.01437
0.0429	0.0002	0.0001	0.0004	0.04401	0.50983	0.0217904	0.00002	3E-05	0.0035587	0.0034	0.0075	0.02821	5.07912
0.0406	0.0002	0.0001	0.0004	0.04185	0.54499	0.0214273	0.00002	3E-05	0.003453	0.0034	0.0075	0.02786	5.32384
0.0391	0.0002	0.0001	0.0004	0.04033	0.54005	0.0212024	0.00002	3E-05	0.0033245	0.0034	0.0075	0.02764	5.69012
Ud177	UVR/NR	UVi/NH	Uk/k	UNu/NU	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Ud177	UVR/NR	UVi/NH	Uk/k	UNu/NU	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1105	0.00031	0.0001	0.0004	0.11094	0.50485	0.0259963	0.00002	3E-05	0.0089602	0.0034	0.0075	0.03655	0.85553
0.0996	0.0003	0.0001	0.0004	0.10009	0.49751	0.0256661	0.00002	3E-05	0.00890253	0.0034	0.0075	0.03543	1.00397
0.0943	0.0003	0.0001	0.0004	0.09481	0.15309	0.0253896	0.00002	3E-05	0.0083195	0.0034	0.0075	0.03452	1.15058
0.0884	0.0003	0.0001	0.0004	0.08895	0.54753	0.0250745	0.00002	3E-05	0.0076923	0.0034	0.0075	0.0337	1.31264
0.0822	0.0003	0.0001	0.0004	0.08283	0.54982	0.0248105	0.00002	3E-05	0.0071023	0.0034	0.0075	0.03298	1.50577
0.0752	0.0003	0.0001	0.0004	0.07589	0.53842	0.02444671	0.00002	3E-05	0.0066756	0.0034	0.0075	0.03236	1.67067
0.0714	0.0003	0.0001	0.0004	0.07212	0.54107	0.0241744	0.00002	3E-05	0.00625	0.0034	0.0075	0.0318	1.871
0.0729	0.0003	0.0001	0.0004	0.07353	0.63634	0.0242573	0.00002	3E-05	0.0055371	0.0034	0.0075	0.03133	2.34924
0.07	0.0003	0.0001	0.0004	0.07072	0.65971	0.0241744	0.00002	3E-05	0.0052687	0.0034	0.0075	0.03108	2.57331
0.0661	0.0003	0.0001	0.0004	0.06684	0.65575	0.0239289	0.00002	3E-05	0.00501	0.0034	0.0075	0.03072	2.81051
0.0631	0.0002	0.0001	0.0004	0.06392	0.66385	0.0239695	0.00002	3E-05	0.004771	0.0034	0.0075	0.03059	3.08738
0.0548	0.0002	0.0001	0.0004	0.05572	0.55173	0.0232217	0.00002	3E-05	0.0045413	0.0034	0.0075	0.02987	3.31681
0.0528	0.0002	0.0001	0.0004	0.05371	0.56112	0.0230326	0.00002	3E-05	0.0043554	0.0034	0.0075	0.02961	3.57475
0.0484	0.0002	0.0001	0.0004	0.04946	0.51778	0.0225911	0.00002	3E-05	0.0041687	0.0034	0.0075	0.02916	3.84048
0.0453	0.0002	0.0001	0.0004	0.04642	0.49444	0.0221661	0.00002	3E-05	0.0040056	0.0034	0.0075	0.02874	4.08172
0.045	0.0002	0.0001	0.0004	0.04614	0.52928	0.0221315	0.00002	3E-05	0.0038462	0.0034	0.0075	0.02863	4.41755
0.0434	0.0002	0.0001	0.0004	0.04452	0.53167	0.0219256	0.00002	3E-05	0.0030211	0.0034	0.0075	0.02807	7.01437
0.0429	0.0002	0.0001	0.0004	0.04401	0.50983	0.0217904	0.00002	3E-05	0.0035587	0.0034	0.0075	0.02821	5.07912
0.0406	0.0002	0.0001	0.0004	0.04185	0.54499	0.0214273	0.00002	3E-05	0.003453	0.0034	0.0075	0.02786	5.32384
0.0391	0.0002	0.0001	0.0004	0.04033	0.54005	0.0212024	0.00002	3E-05	0.0033245	0.0034	0.0075	0.02764	5.69012
Ud177	UVR/NR	UVi/NH	Uk/k	UNu/NU	UNu	UTavg/UTavg	Uiff	UV/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Std		1.25		L (m)		0.65000		L (m)		0.65000		L (m)		0.65000		L (m)		0.65000	
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (ml/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi	
1	1461	100	0.05492	3.26000	29.5	23.7	5.8	26.6	0.026127	2.46038	347.044	1.57E-05	0.00134	0.01137	0.084	5991	0.7616	0.921	
2	1461	150	0.06392	3.79116	31.2	23.7	7.5	27.45	0.026189	2.56775	347.536	1.58E-05	0.00201	0.01708	0.084	5862	1.7097	0.916	
3	1461	202	0.07033	4.19783	31.4	23.7	7.7	27.55	0.026196	3.00653	347.594	1.58E-05	0.0027	0.023	0.084	5859	3.0998	0.915	
4	1461	250	0.07812	4.66223	32.7	23.7	9	28.2	0.026244	3.12219	347.969	1.59E-05	0.00334	0.0285	0.084	5836	4.7401	0.912	
5	1461	300	0.08594	5.12819	33.7	23.7	10	28.7	0.02628	3.5126	348.258	1.59E-05	0.00401	0.03423	0.084	5819	6.8171	0.909	
6	1461	347	0.09316	5.59607	35.2	23.7	11.5	29.45	0.026335	3.6282	348.69	1.6E-05	0.00464	0.03964	0.084	5794	9.1031	0.905	
7	1461	401	0.10161	6.06426	35.1	23.7	11.4	29.4	0.026331	4.2987	348.661	1.6E-05	0.00536	0.0458	0.084	5795	12.156	0.906	
8	1461	450	0.10951	6.53378	35.7	23.7	12	29.7	0.026353	4.7396	348.834	1.6E-05	0.00602	0.05143	0.084	5785	15.3	0.904	
9	1461	497	0.11734	7.00322	36	23.7	12.3	29.85	0.026364	6.30688	348.92	1.6E-05	0.00664	0.05681	0.084	5780	18.855	0.903	
10	1461	548	0.12518	7.47142	36.7	23.7	13	30.2	0.026389	5.7794	349.122	1.6E-05	0.00733	0.06268	0.083	5768	22.66	0.901	
11	1461	598	0.13293	7.93373	37.3	23.7	13.6	30.5	0.026411	6.1487	349.294	1.61E-05	0.00799	0.06843	0.083	5758	26.984	0.9	
12	1461	647	0.14077	8.40193	37.8	23.7	14.1	30.75	0.026429	6.6467	349.438	1.61E-05	0.00865	0.07407	0.083	5750	31.544	0.898	
13	1461	699	0.14881	8.88134	38.3	23.7	14.6	31	0.026447	7.1676	349.582	1.61E-05	0.00934	0.08005	0.083	5742	36.795	0.897	
14	1461	747	0.15643	9.33634	38.7	23.7	15	31.2	0.026462	7.7054	349.697	1.61E-05	0.00999	0.08558	0.083	5735	42.001	0.896	
15	1461	799	0.16425	9.80293	38.2	23.7	14.5	30.95	0.026444	8.7837	349.553	1.61E-05	0.01068	0.09115	0.083	5743	48.082	0.897	
16	1461	850	0.17207	10.26989	39.3	23.7	15.6	31.5	0.026444	8.9874	349.869	1.62E-05	0.01136	0.09743	0.083	5725	54.341	0.895	
17	1461	903	0.17999	10.73666	40.2	23.7	16.5	31.95	0.026516	9.2447	350.127	1.62E-05	0.01207	0.10358	0.083	5710	61.259	0.892	
18	1461	944	0.18769	11.20182	41.6	23.8	17.8	32.7	0.026571	9.3109	350.557	1.63E-05	0.01262	0.10841	0.083	5695	68.823	0.898	
19	1461	1009	0.19550	11.66841	40.9	23.8	17.1	32.35	0.026545	10.324	350.357	1.62E-05	0.01349	0.11581	0.083	5697	76.409	0.89	
20	1461	1140	0.20333	12.13556	41.7	23.8	17.9	32.75	0.026574	10.163	350.586	1.63E-05	0.01524	0.13093	0.083	5684	97.44	0.898	
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (ml/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi	

Ud777	UVR/VR	UVH/VH	Uk/k	UNu/NU	UNu	Ufavg/Favg	Uff	Uvv	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs
0.1219	0.0003	0.0001	0.0004	0.12232	0.30107	0.0265627	0.00002	3E-05	0.0034	0.0075	0.10477	0.07979	
0.0943	0.0003	0.0001	0.0004	0.09481	0.24343	0.0257596	0.00002	3E-05	0.0333333	0.0034	0.0075	0.07334	0.12539
0.0918	0.0003	0.0001	0.0004	0.09238	0.28316	0.0256661	0.00002	3E-05	0.0247525	0.0034	0.0075	0.05814	0.18021
0.0786	0.0003	0.0001	0.0004	0.0792	0.25575	0.0250745	0.00002	3E-05	0.02	0.0034	0.0075	0.04999	0.23697
0.0707	0.0003	0.0001	0.0004	0.07142	0.25695	0.0246376	0.00002	3E-05	0.0166667	0.0034	0.0075	0.04459	0.304
0.0615	0.0003	0.0001	0.0004	0.06823	0.22803	0.0240102	0.00002	3E-05	0.0144092	0.0034	0.0075	0.04096	0.37283
0.062	0.0003	0.0001	0.0004	0.06283	0.27009	0.024051	0.00002	3E-05	0.0124688	0.0034	0.0075	0.03835	0.46628
0.0589	0.0003	0.0001	0.0004	0.05977	0.26329	0.0238081	0.00002	3E-05	0.0111111	0.0034	0.0075	0.03648	0.5582
0.0575	0.0003	0.0001	0.0004	0.05635	0.30967	0.0236684	0.00002	3E-05	0.0100614	0.0034	0.0075	0.03516	0.65598
0.0544	0.0003	0.0001	0.0004	0.05531	0.31577	0.0234419	0.00002	3E-05	0.0091241	0.0034	0.0075	0.03394	0.76901
0.052	0.0003	0.0001	0.0004	0.05295	0.32557	0.0231836	0.00002	3E-05	0.0083612	0.0034	0.0075	0.03298	0.88922
0.0501	0.0003	0.0001	0.0004	0.05114	0.33991	0.0229951	0.00002	3E-05	0.007728	0.0034	0.0075	0.03222	1.01633
0.0484	0.0003	0.0001	0.0004	0.04946	0.35448	0.0228097	0.00002	3E-05	0.0071531	0.0034	0.0075	0.03155	1.16087
0.0471	0.0002	0.0001	0.0004	0.04619	0.37134	0.0226635	0.00002	3E-05	0.0066934	0.0034	0.0075	0.03104	1.30356
0.0468	0.0002	0.0001	0.0004	0.04978	0.43778	0.0228465	0.00002	3E-05	0.0062578	0.0034	0.0075	0.03081	1.48124
0.0453	0.0002	0.0001	0.0004	0.04642	0.41581	0.0224476	0.00002	3E-05	0.0058824	0.0034	0.0075	0.03021	1.64172
0.0429	0.0002	0.0001	0.0004	0.04401	0.40685	0.02221315	0.00002	3E-05	0.0055371	0.0034	0.0075	0.02971	1.82022
0.0397	0.0002	0.0001	0.0004	0.04097	0.38137	0.0216239	0.00002	3E-05	0.0052956	0.0034	0.0075	0.02916	1.9485
0.0414	0.0002	0.0001	0.0004	0.04255	0.44777	0.0218578	0.00002	3E-05	0.0049554	0.0034	0.0075	0.02809	2.223
0.0395	0.0002	0.0001	0.0004	0.04075	0.44227	0.0215508	0.00002	3E-05	0.0043866	0.0034	0.0075	0.02852	2.77927
Ud777	UVR/VR	UVH/VH	Uk/k	UNu/NU	UNu	Ufavg/Favg	Uff	Uvv	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs

Ud777	UVR/VR	UVH/VH	Uk/k	UNu/NU	UNu	Ufavg/Favg	Uff	Uvv	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs
0.1219	0.0003	0.0001	0.0004	0.12232	0.30107	0.0265627	0.00002	3E-05	0.0034	0.0075	0.10477	0.07979	
0.0943	0.0003	0.0001	0.0004	0.09481	0.24343	0.0257596	0.00002	3E-05	0.0333333	0.0034	0.0075	0.07334	0.12539
0.0918	0.0003	0.0001	0.0004	0.09238	0.28316	0.0256661	0.00002	3E-05	0.0247525	0.0034	0.0075	0.05814	0.18021
0.0786	0.0003	0.0001	0.0004	0.0792	0.25575	0.0250745	0.00002	3E-05	0.02	0.0034	0.0075	0.04999	0.23697
0.0707	0.0003	0.0001	0.0004	0.07142	0.25695	0.0246376	0.00002	3E-05	0.0166667	0.0034	0.0075	0.04459	0.304
0.0615	0.0003	0.0001	0.0004	0.06823	0.22803	0.0240102	0.00002	3E-05	0.0144092	0.0034	0.0075	0.04096	0.37283
0.062	0.0003	0.0001	0.0004	0.06283	0.27009	0.024051	0.00002	3E-05	0.0124688	0.0034	0.0075	0.03835	0.46628
0.0589	0.0003	0.0001	0.0004	0.05977	0.26329	0.0238081	0.00002	3E-05	0.0111111	0.0034	0.0075	0.03648	0.5582
0.0575	0.0003	0.0001	0.0004	0.05635	0.30967	0.0236684	0.00002	3E-05	0.0100614	0.0034	0.0075	0.03516	0.65598
0.0544	0.0003	0.0001	0.0004	0.05531	0.31577	0.0234419	0.00002	3E-05	0.0091241	0.0034	0.0075	0.03394	0.76901
0.052	0.0003	0.0001	0.0004	0.05295	0.32557	0.0231836	0.00002	3E-05	0.0083612	0.0034	0.0075	0.03298	0.88922
0.0501	0.0003	0.0001	0.0004	0.05114	0.33991	0.0229951	0.00002	3E-05	0.007728	0.0034	0.0075	0.03222	1.01633
0.0484	0.0003	0.0001	0.0004	0.04946	0.35448	0.0228097	0.00002	3E-05	0.0071531	0.0034	0.0075	0.03155	1.16087
0.0471	0.0002	0.0001	0.0004	0.04619	0.37134	0.0226635	0.00002	3E-05	0.0066934	0.0034	0.0075	0.03104	1.30356
0.0468	0.0002	0.0001	0.0004	0.04978	0.43778	0.0228465	0.00002	3E-05	0.0062578	0.0034	0.0075	0.03081	1.48124
0.0453	0.0002	0.0001	0.0004	0.04642	0.41581	0.0224476	0.00002	3E-05	0.0058824	0.0034	0.0075	0.03021	1.64172
0.0429	0.0002	0.0001	0.0004	0.04401	0.40685	0.02221315	0.00002	3E-05	0.0055371	0.0034	0.0075	0.02971	1.82022
0.0397	0.0002	0.0001	0.0004	0.04097	0.38137	0.0216239	0.00002	3E-05	0.0052956	0.0034	0.0075	0.02916	1.9485
0.0414	0.0002	0.0001	0.0004	0.04255	0.44777	0.0218578	0.00002	3E-05	0.0049554	0.0034	0.0075	0.02809	2.223
0.0395	0.0002	0.0001	0.0004	0.04075	0.44227	0.0215508	0.00002	3E-05	0.0043866	0.0034	0.0075	0.02852	2.77927
Ud777	UVR/VR	UVH/VH	Uk/k	UNu/NU	UNu	Ufavg/Favg	Uff	Uvv	Uvmic/Vmic	UG/G	US/S	URs/Rs	URs

Snd	L (m)										0.24000									
	#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R_s	phi	
1	383	402	0.13827	8.25489	37	25.2	11.8	31.1	0.026455	7.657	349.539	1.613E-05	0.00537	0.1756	0.021853	1504.297	46.4116	0.94019		
2	383	502	0.14735	8.79721	36.9	24.4	12.5	30.65	0.026422	8.219	349.391	1.608E-05	0.00671	0.2192	0.021859	1508.233	72.4558	0.94265		
3	383	601	0.15565	9.28271	35.2	24.4	10.8	29.8	0.02636	10.64	348.892	1.6E-05	0.00803	0.262	0.021859	151.5713	104.075	0.94732		
4	383	703	0.16421	9.80332	35.9	24.3	11.6	30.1	0.026362	11.02	349.064	1.603E-05	0.0094	0.3067	0.021869	153.066	142.202	0.94557		
5	383	800	0.17261	10.30523	35.4	24.4	11	29.9	0.026367	12.84	348.949	1.601E-05	0.01069	0.3489	0.021896	151.4829	184.36	0.94677		
6	383	902	0.18171	10.84818	34.5	24.4	10.1	29.45	0.026355	15.62	348.69	1.597E-05	0.01206	0.393	0.021912	151.81	234.635	0.94926		
7	383	1006	0.19035	11.38426	34.5	24	10.1	29.45	0.026335	17.03	348.69	1.597E-05	0.01345	0.4384	0.021912	151.81	201.862	0.94926		
8	383	1098	0.19899	11.88023	34.2	24.4	9.8	29.3	0.026324	18.19	348.604	1.596E-05	0.01468	0.4783	0.021917	152.0141	347.818	0.95009		
9	383	1205	0.20742	12.38318	34.2	24.5	9.7	29.35	0.026327	21.06	348.632	1.596E-05	0.01611	0.525	0.021916	151.9697	418.858	0.94981		
10	383	1301	0.21629	12.91290	34.2	24.6	9.6	29.4	0.026331	23.14	348.661	1.597E-05	0.01739	0.5669	0.021914	151.9254	488.183	0.94953		
11	383	1402	0.22480	13.42110	33.4	24.4	9	28.9	0.026295	26.7	348.373	1.592E-05	0.01874	0.6104	0.021932	152.3699	667.654	0.95231		
12	383	1503	0.23405	13.97340	33.5	24.6	8.9	28.05	0.026305	29.25	348.459	1.593E-05	0.02009	0.6545	0.021927	152.2363	652.14	0.95148		
13	383	1596	0.24214	14.45640	33.4	24.6	8.8	29	0.026302	31.67	348.431	1.593E-05	0.02133	0.6549	0.021928	152.2808	735.434	0.95176		
14	383	1603	0.25115	14.98400	34	24.6	9.4	29.3	0.026324	31.87	348.604	1.596E-05	0.02143	0.6583	0.021917	152.0141	741.335	0.95009		
15	383	1696	0.25980	15.51060	34.2	24.5	9.7	29.35	0.026327	33.04	348.632	1.596E-05	0.02267	0.7389	0.021916	151.9697	829.744	0.94981		
16	383	1800	0.25823	16.01355	34.2	24.7	9.5	29.45	0.026335	35.95	348.69	1.597E-05	0.02406	0.7844	0.021912	151.881	834.388	0.94926		
17	383	1894	0.27757	16.57110	34.3	24.5	9.8	29.4	0.026331	37.33	348.661	1.597E-05	0.02532	0.8252	0.021914	151.9254	1034.66	0.94923		
18	383	2005	0.28624	17.08870	34.4	24.5	9.9	29.45	0.026335	39.29	348.69	1.597E-05	0.02668	0.8737	0.021912	151.881	1159.34	0.94926		
19	383	2104	0.29471	17.59480	34.8	24	10.4	29.6	0.026345	39.63	348.776	1.599E-05	0.02813	0.917	0.021907	151.7461	1276.17	0.94863		
20	383	2200	0.30289	18.08310	35	24.5	10.5	29.75	0.026356	41.45	348.863	1.6E-05	0.02941	0.9591	0.021901	151.6154	1394.76	0.9476		
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R_s	phi		

UdTTT	UVRRVR	UVFH	UkR	UNuNu	UNu	UTavg/Tavg	Uff	Uv/v	Uymic/Vmic	UG/G	US/S	URs/Rs	URs
0.06	0.00025	0.00012	4E-04	0.0608	0.47	0.0227363	0.00002	3.1E-05	0.0124378	0.0034	0.00749	0.0374991	1.74039
0.057	0.00025	0.00012	4E-04	0.0574	0.47	0.0230701	0.00002	3.1E-05	0.0098602	0.0034	0.00749	0.0346338	2.50942
0.065	0.00025	0.00019	4E-04	0.0662	0.7	0.0237282	0.00002	3.1E-05	0.0083195	0.0034	0.00749	0.0333216	3.46794
0.061	0.00025	0.000119	4E-04	0.0618	0.68	0.0234917	0.00002	3.1E-05	0.0071124	0.0034	0.00749	0.0320101	4.55477
0.064	0.00024	0.000119	4E-04	0.0651	0.84	0.0236488	0.00002	3.1E-05	0.00625	0.0034	0.00749	0.0314001	5.78893
0.07	0.00024	0.000119	4E-04	0.0707	1.1	0.0240102	0.00002	3.1E-05	0.0055432	0.0034	0.00749	0.0311423	7.30713
0.07	0.00024	0.000119	4E-04	0.0707	1.2	0.0240102	0.00002	3.1E-05	0.0049702	0.0034	0.00749	0.030753	8.97564
0.072	0.00024	0.000118	4E-04	0.0728	1.4	0.0241331	0.00002	3.1E-05	0.0045537	0.0034	0.00749	0.0305908	10.64
0.073	0.00024	0.000118	4E-04	0.0736	1.55	0.024092	0.00002	3.1E-05	0.0041494	0.0034	0.00749	0.0303272	12.7028
0.074	0.00024	0.000118	4E-04	0.0743	1.72	0.024051	0.00002	3.1E-05	0.0036432	0.0034	0.00749	0.0301327	14.7106
0.079	0.00024	0.000118	4E-04	0.0792	2.11	0.0244671	0.00002	3.1E-05	0.0035663	0.0034	0.00749	0.0303309	17.2174
0.079	0.00024	0.000118	4E-04	0.0801	2.34	0.0243408	0.00002	3.1E-05	0.0033267	0.0034	0.00749	0.0301196	19.6422
0.08	0.00023	0.000118	4E-04	0.081	2.56	0.0243826	0.00002	3.1E-05	0.0031328	0.0034	0.00749	0.0300703	22.1147
0.075	0.00023	0.000118	4E-04	0.0759	2.42	0.0244331	0.00002	3.1E-05	0.0031192	0.0034	0.00749	0.0298625	22.1381
0.073	0.00023	0.000118	4E-04	0.0736	2.43	0.024092	0.00002	3.1E-05	0.0029481	0.0034	0.00749	0.0297596	24.6929
0.074	0.00023	0.000117	4E-04	0.0751	2.7	0.0240102	0.00002	3.1E-05	0.0027778	0.0034	0.00749	0.0296277	27.6838
0.072	0.00023	0.000117	4E-04	0.0728	2.72	0.024051	0.00002	3.1E-05	0.0028399	0.0034	0.00749	0.0296104	30.6386
0.071	0.00023	0.000117	4E-04	0.0721	2.83	0.0240102	0.00002	3.1E-05	0.0024938	0.0034	0.00749	0.0295264	34.2312
0.068	0.00023	0.000117	4E-04	0.0687	2.72	0.0238865	0.00002	3.1E-05	0.0023764	0.0034	0.00749	0.0293887	37.505
0.067	0.00023	0.000117	4E-04	0.0681	2.82	0.0237681	0.00002	3.1E-05	0.0022727	0.0034	0.00749	0.029258	40.8077
UdTTT	UVRRVR	UVFH	UkR	UNuNu	UNu	UTavg/Tavg	Uff	Uv/v	Uymic/Vmic	UG/G	US/S	URs/Rs	URs

UdTTT	UVRRVR	UVFH	UkR	UNuNu	UNu	UTavg/Tavg	Uff	Uv/v	Uymic/Vmic	UG/G	US/S	URs/Rs	URs
0.06	0.00025	0.00012	4E-04	0.0608	0.47	0.0227363	0.00002	3.1E-05	0.0124378	0.0034	0.00749	0.0374991	1.74039
0.057	0.00025	0.00012	4E-04	0.0574	0.47	0.0230701	0.00002	3.1E-05	0.0098602	0.0034	0.00749	0.0346338	2.50942
0.065	0.00025	0.00019	4E-04	0.0662	0.7	0.0237282	0.00002	3.1E-05	0.0083195	0.0034	0.00749	0.0333216	3.46794
0.061	0.00025	0.000119	4E-04	0.0618	0.68	0.0234917	0.00002	3.1E-05	0.0071124	0.0034	0.00749	0.0320101	4.55477
0.064	0.00024	0.000119	4E-04	0.0651	0.84	0.0236488	0.00002	3.1E-05	0.00625	0.0034	0.00749	0.0314001	5.78893
0.07	0.00024	0.000119	4E-04	0.0707	1.1	0.0240102	0.00002	3.1E-05	0.0055432	0.0034	0.00749	0.0311423	7.30713
0.07	0.00024	0.000119	4E-04	0.0707	1.2	0.0240102	0.00002	3.1E-05	0.0049702	0.0034	0.00749	0.030753	8.97564
0.072	0.00024	0.000118	4E-04	0.0728	1.4	0.0241331	0.00002	3.1E-05	0.0045537	0.0034	0.00749	0.0305908	10.64
0.073	0.00024	0.000118	4E-04	0.0736	1.55	0.024092	0.00002	3.1E-05	0.0041494	0.0034	0.00749	0.0303272	12.7028
0.074	0.00024	0.000118	4E-04	0.0743	1.72	0.024051	0.00002	3.1E-05	0.0036432	0.0034	0.00749	0.0301327	14.7106
0.079	0.00024	0.000118	4E-04	0.0792	2.11	0.0244671	0.00002	3.1E-05	0.0035663	0.0034	0.00749	0.0303309	17.2174
0.079	0.00024	0.000118	4E-04	0.0801	2.34	0.0243408	0.00002	3.1E-05	0.0033267	0.0034	0.00749	0.0301196	19.6422
0.08	0.00023	0.000118	4E-04	0.081	2.56	0.0243826	0.00002	3.1E-05	0.0031328	0.0034	0.00749	0.0300703	22.1147
0.075	0.00023	0.000118	4E-04	0.0759	2.42	0.0244331	0.00002	3.1E-05	0.0031192	0.0034	0.00749	0.0298625	22.1381
0.073	0.00023	0.000118	4E-04	0.0736	2.43	0.024092	0.00002	3.1E-05	0.0029481	0.0034	0.00749	0.0297596	24.6929
0.074	0.00023	0.000117	4E-04	0.0751	2.7	0.0240102	0.00002	3.1E-05	0.0027778	0.0034	0.00749	0.0296277	27.6838
0.072	0.00023	0.000117	4E-04	0.0728	2.72	0.024051	0.00002	3.1E-05	0.0028399	0.0034	0.00749	0.0296104	30.6386
0.071	0.00023	0.000117	4E-04	0.0721	2.83	0.0240102	0.00002	3.1E-05	0.0024938	0.0034	0.00749	0.0295264	34.2312
0.068	0.00023	0.000117	4E-04	0.0687	2.72	0.0238865	0.00002	3.1E-05	0.0023764	0.0034	0.00749	0.0293887	37.505
0.067	0.00023	0.000117	4E-04	0.0681	2.82	0.0237681	0.00002	3.1E-05	0.0022727	0.0034	0.00749	0.029258	40.8077
UdTTT	UVRRVR	UVFH	UkR	UNuNu	UNu	UTavg/Tavg	Uff	Uv/v	Uymic/Vmic	UG/G	US/S	URs/Rs	URs

#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tauvg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	Sud
																		1.5
																		0.65
1	676	923.7	0.20355	12.17028	40.3	26	14.3	33.15	0.076603	13.64	350.8175	1.632E-05	0.01235	0.2294	0.038441	2623.936	138.121	1.6399
2	676	1222.3	0.24323	14.54290	37.8	24.8	13	31.3	0.026469	21.63	349.754	1.614E-05	0.01634	0.3027	0.038557	2652.027	2421.76	1.65752
3	676	1562	0.29153	17.43050	39.1	24.3	14.8	31.7	0.026488	27.13	349.984	1.618E-05	0.02008	0.3871	0.038532	2645.89	396.4	1.65368
4	676	2180	0.32559	19.44910	38.7	25.5	13.2	32.1	0.026527	37.84	350.213	1.622E-05	0.02914	0.5406	0.038507	2639.776	771.947	1.64986
5	676	2067	0.35679	21.33245	43.4	25.9	17.5	34.65	0.026712	34.1	351.673	1.646E-05	0.02783	0.5147	0.038347	2601.339	689.065	1.62584
6	676	2394	0.35613	21.28310	40.4	24.9	16.5	32.65	0.026597	38.56	350.529	1.622E-05	0.032	0.5942	0.038472	2631.407	928.94	1.64463
7	676	2017	0.31074	18.57910	39.8	25.3	14.5	32.55	0.02656	31.39	350.471	1.626E-05	0.02696	0.5005	0.038478	2632.925	659.388	1.64558
8	676	1111	0.17787	10.63470	34.8	24.9	9.9	29.85	0.026364	15.18	348.92	1.601E-05	0.01495	0.2745	0.0365	2674.473	201.476	1.67155
9	676	1045	0.15934	9.52690	33.2	24.7	8.5	28.95	0.026288	14.22	348.402	1.593E-05	0.01397	0.2578	0.038707	2688.562	178.656	1.68035
10	676	1112	0.11866	7.09490	29.1	24.4	4.7	26.75	0.026138	14.35	347.131	1.572E-05	0.01496	0.2733	0.038849	2723.523	203.438	1.7022
11	676	1657	0.20400	12.19721	33.2	25.1	8.1	29.15	0.026313	24.45	348.577	1.594E-05	0.02215	0.4089	0.038694	2685.421	446.962	1.67339
12	676	1509	0.23296	13.92270	36.1	25.8	10.3	30.95	0.026444	24.93	349.553	1.611E-05	0.02017	0.3735	0.03858	2657.417	370.854	1.66089
13	676	2578	0.33616	20.0920	38.6	25.7	12.9	32.15	0.026531	41.34	350.242	1.622E-05	0.03446	0.6393	0.038504	2639.013	1078.57	1.64938
14	676	1925	0.25878	15.47270	37.2	25.7	11.5	31.45	0.026448	27.54	349.84	1.616E-05	0.02573	0.4768	0.038548	2649.723	602.429	1.65608
15	676	985	0.22283	13.32310	41.9	25.8	16.1	33.85	0.026654	14.49	351.216	1.638E-05	0.01317	0.2449	0.038397	2613.298	156.78	1.63331
16	676	767	0.18213	10.88946	40.8	25.5	15.3	33.15	0.026603	10.2	350.815	1.632E-05	0.01025	0.1905	0.038441	2623.836	95.2332	1.63939
17	676	1268	0.20938	12.51920	37.1	25.5	11.6	31.3	0.026499	17.88	349.754	1.614E-05	0.01695	0.314	0.038557	2652.027	261.485	1.65752
18	676	1257	0.24112	14.41700	41.3	25.1	16.2	33.2	0.026607	16.89	350.844	1.632E-05	0.0168	0.3122	0.038438	2623.081	265.749	1.63943
19	676	1328	0.27489	16.43560	43.3	25.5	17.8	34.4	0.026654	19.91	351.53	1.644E-05	0.01775	0.3305	0.038363	2605.066	284.606	1.62817
20	676	1417	0.16747	10.01310	32.3	25	7.3	28.65	0.026276	18.31	348.229	1.59E-05	0.01894	0.3494	0.038726	2693.286	328.742	1.6833
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tauvg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi

UdT/T	UVR/NR	UVH/NH	Ukk	UNu/NU	UNu	UTavg/Tavg	U/f	U/v/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.049	0.00024	0.000118	4E-04	0.0505	0.69	0.0213303	0.00002	3.1E-05	0.005413	0.0034	0.00749	0.0290281	4.00939
0.054	0.00023	0.000118	4E-04	0.0553	1.19	0.0225911	0.00002	3.1E-05	0.0040806	0.0034	0.00749	0.0291159	7.07447
0.048	0.00023	0.000117	4E-04	0.0488	1.32	0.022306	0.00002	3.1E-05	0.003201	0.0034	0.00749	0.0284427	11.2747
0.054	0.00023	0.000117	4E-04	0.0545	2.06	0.022028	0.00002	3.1E-05	0.0022936	0.0034	0.00749	0.0278697	21.4972
0.04	0.00023	0.000117	4E-04	0.0416	1.42	0.0204069	0.00002	3E-05	0.002419	0.0034	0.00749	0.0266513	18.3645
0.046	0.00023	0.000117	4E-04	0.0467	1.8	0.021657	0.00002	3.1E-05	0.0020886	0.0034	0.00749	0.0275122	25.5571
0.048	0.00023	0.000117	4E-04	0.0498	1.56	0.0217255	0.00002	3.1E-05	0.0024789	0.0034	0.00749	0.0276936	18.2658
0.071	0.00024	0.000119	4E-04	0.0721	1.09	0.0236884	0.00002	3.1E-05	0.0045005	0.0034	0.00749	0.0302093	6.08645
0.083	0.00025	0.000119	4E-04	0.0838	1.19	0.0244249	0.00002	3.1E-05	0.0047847	0.0034	0.00749	0.0309612	5.53139
0.15	0.00026	0.000121	4E-04	0.1508	2.16	0.0264336	0.00002	3.2E-05	0.0044964	0.0034	0.00749	0.0324045	6.5923
0.087	0.00024	0.000118	4E-04	0.0879	2.15	0.0242573	0.00002	3.1E-05	0.0030175	0.0034	0.00749	0.0299213	13.4335
0.069	0.00024	0.000118	4E-04	0.0694	1.73	0.0228465	0.00002	3.1E-05	0.0033135	0.0034	0.00749	0.0269193	10.7719
0.055	0.00023	0.000117	4E-04	0.0557	2.3	0.0219938	0.00002	3.1E-05	0.0019395	0.0034	0.00749	0.0277348	28.9139
0.061	0.00023	0.000118	4E-04	0.0623	1.72	0.0224833	0.00002	3.1E-05	0.0025974	0.0034	0.00749	0.028336	17.0705
0.044	0.00024	0.000118	4E-04	0.045	0.65	0.0208892	0.00002	3.1E-05	0.0050761	0.0034	0.00749	0.0284583	4.46193
0.046	0.00024	0.000119	4E-04	0.0473	0.48	0.0213303	0.00002	3.1E-05	0.0055189	0.0034	0.00749	0.0299235	2.84977
0.061	0.00024	0.000118	4E-04	0.0618	1.1	0.0225911	0.00002	3.1E-05	0.0039432	0.0034	0.00749	0.0290344	7.59206
0.044	0.00023	0.000118	4E-04	0.0448	0.76	0.0212982	0.00002	3.1E-05	0.0039777	0.0034	0.00749	0.0260597	7.17625
0.04	0.00023	0.000117	4E-04	0.041	0.82	0.0205552	0.00002	3E-05	0.0037651	0.0034	0.00749	0.02738	7.79253
0.097	0.00025	0.000119	4E-04	0.0974	1.78	0.0246806	0.00002	3.1E-05	0.0035286	0.0034	0.00749	0.0304858	10.022
UdT/T	UVR/NR	UVH/NH	Ukk	UNu/NU	UNu	UTavg/Tavg	U/f	U/v/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Std 1.5		L (m)		0.60000																
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k (W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	h^2	Rs	phi		
1	723	834	0.10170	6.08054	31	25.8	5.2	28.4	0.0282558	9.484	348.084	1.587E-05	0.01115	0.1922	0.041438	2864.763	108.545	1.80258		
2	723	858	0.10598	6.33678	31.3	25.8	5.5	28.55	0.0282669	9.734	348.171	1.589E-05	0.01147	0.1978	0.041426	2882.229	112.722	1.80159		
3	723	875	0.11112	6.64411	31.3	25.9	5.4	28.6	0.028273	10.9	348.2	1.589E-05	0.0117	0.2017	0.041422	2881.385	117.218	1.80087		
4	723	901	0.11894	7.11141	32	26	6	29	0.028302	11.22	348.431	1.593E-05	0.01204	0.2078	0.041395	2874.649	124.162	1.79686		
5	723	887	0.13576	8.11739	33.8	26	7.8	29.9	0.028367	11.22	348.949	1.601E-05	0.01186	0.2049	0.041333	2869.587	120.089	1.78724		
6	723	928	0.14433	8.62930	34.3	25.9	8.4	30.1	0.028382	11.77	349.064	1.603E-05	0.01241	0.2144	0.04132	2866.257	131.348	1.78516		
7	723	1061	0.16002	9.56750	34.4	25.8	8.6	30.1	0.028382	14.13	349.064	1.603E-05	0.01418	0.2452	0.04132	2866.257	171.696	1.78516		
8	723	1128	0.17849	10.67210	35.5	25.9	9.6	30.7	0.028426	15.72	349.409	1.609E-05	0.01508	0.2809	0.041279	2846.307	193.772	1.77894		
9	723	1250	0.19544	11.68570	36.5	26	10.5	31.25	0.028465	17.21	349.725	1.614E-05	0.01671	0.2894	0.041242	2837.236	237.624	1.77327		
10	723	1322	0.22115	13.22290	38.9	26.2	12.7	32.55	0.02856	18.16	350.471	1.626E-05	0.01767	0.3067	0.041154	2815.983	284.923	1.75998		
11	723	1381	0.25469	15.22810	41.9	26	15.9	33.95	0.028661	19.18	351.273	1.639E-05	0.01846	0.3211	0.041095	2793.387	288.091	1.74587		
12	723	1512	0.28957	17.31379	44.1	26.6	17.5	35.35	0.026763	22.42	352.073	1.653E-05	0.02021	0.3524	0.040967	2771.088	344.144	1.73193		
13	723	1586	0.32313	19.32000	47.7	27	20.7	37.35	0.028507	23.47	353.212	1.671E-05	0.02093	0.3662	0.040834	2759.735	307.364	1.71233		
14	723	2008	0.34015	20.33160	44.1	26.4	17.7	35.25	0.026755	30.59	352.016	1.652E-05	0.02884	0.4679	0.040973	2772.671	607.115	1.73292		
15	723	2189	0.34015	20.33760	44.1	26.8	17.3	35.45	0.02677	31.28	352.13	1.653E-05	0.02926	0.5103	0.04098	2769.506	721.142	1.73094		
16	723	1768	0.26251	15.69560	39.4	25.9	13.5	32.65	0.026567	24.06	350.529	1.627E-05	0.02363	0.4103	0.041147	2814.359	473.71	1.75897		
17	723	1919	0.27994	16.73860	39.5	25.8	13.7	32.65	0.026567	26.98	350.529	1.627E-05	0.02565	0.4453	0.041147	2814.359	568.082	1.75897		
18	723	1980	0.28868	17.26020	39.8	25.9	13.9	32.85	0.026582	28.24	350.643	1.629E-05	0.02647	0.4596	0.041134	2811.116	683.828	1.75695		
19	723	1711	0.25447	15.21470	38.4	25.9	12.5	32.15	0.026531	24.45	350.242	1.622E-05	0.02287	0.3967	0.041181	2822.485	444.212	1.76406		
20	723	2169	0.34101	20.38910	43.1	25.8	17.3	34.45	0.026698	31.52	351.599	1.644E-05	0.02899	0.5048	0.041026	2785.39	709.777	1.74087		
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k (W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	h^2	Rs	phi		

Ud <sup>TT</sup>	UVR <sup>VR</sup>	UVH <sup>WH</sup>	Uk <sup>k</sup>	Uu <sup>u</sup>	Uu <sup>u</sup>	U <sup>v</sup>	U <sup>v</sup>	U <sup>m</sup> icVm <sup>c</sup>	U <sup>g</sup> /G	U <sup>s</sup> /S	U <sup>s</sup> Rs	URs
0.136	0.00027	0.000122	4E-04	0.1363	1.29	0.0246979	0.00002	3.1E-05	0.00569852	0.0034	0.00749	0.0321578
0.129	0.00027	0.000121	4E-04	0.129	1.26	0.0247671	0.00002	3.1E-05	0.00569275	0.0034	0.00749	0.0319326
0.131	0.00026	0.000121	4E-04	0.1313	1.43	0.0247238	0.00002	3.1E-05	0.0057143	0.0034	0.00749	0.031817
0.118	0.00026	0.000121	4E-04	0.1183	1.33	0.0243828	0.00002	3.1E-05	0.0055494	0.0034	0.00749	0.0314348
0.091	0.00025	0.00012	4E-04	0.0912	1.02	0.0235488	0.00002	3.1E-05	0.005637	0.0034	0.00749	0.0309324
0.084	0.00025	0.00012	4E-04	0.0848	1	0.0234917	0.00002	3.1E-05	0.0059879	0.0034	0.00749	0.0306337
0.082	0.00025	0.000119	4E-04	0.0828	1.17	0.0234917	0.00002	3.1E-05	0.0047125	0.0034	0.00749	0.0301851
0.074	0.00024	0.000119	4E-04	0.0743	1.17	0.0230326	0.00002	3.1E-05	0.0044326	0.0034	0.00749	0.029657
0.067	0.00024	0.000118	4E-04	0.0681	1.17	0.0226272	0.00002	3.1E-05	0.004	0.0034	0.00749	0.0290936
0.056	0.00024	0.000118	4E-04	0.0566	1.03	0.0217235	0.00002	3.1E-05	0.0037821	0.0034	0.00749	0.0282768
0.044	0.00023	0.000118	4E-04	0.0456	0.87	0.0208277	0.00002	3E-05	0.0036206	0.0034	0.00749	0.0275077
0.04	0.00023	0.000117	4E-04	0.0416	0.93	0.0200028	0.00002	3E-05	0.0035069	0.0034	0.00749	0.0267264
0.034	0.00023	0.000117	4E-04	0.0356	0.84	0.0189317	0.00002	3E-05	0.0031928	0.0034	0.00749	0.0258773
0.04	0.00023	0.000117	4E-04	0.0412	1.26	0.0200596	0.00002	3E-05	0.00249	0.0034	0.00749	0.0264128
0.041	0.00023	0.000117	4E-04	0.0421	1.32	0.0193464	0.00002	3E-05	0.0022841	0.0034	0.00749	0.0262521
0.052	0.00023	0.000118	4E-04	0.0533	1.28	0.021657	0.00002	3.1E-05	0.0028281	0.0034	0.00749	0.0277752
0.052	0.00023	0.000117	4E-04	0.0526	1.42	0.021657	0.00002	3.1E-05	0.0026055	0.0034	0.00749	0.027688
0.051	0.00023	0.000117	4E-04	0.0518	1.46	0.0215251	0.00002	3.1E-05	0.0025253	0.0034	0.00749	0.0275551
0.057	0.00023	0.000118	4E-04	0.0574	1.4	0.0219938	0.00002	3.1E-05	0.0029223	0.0034	0.00749	0.0280772
0.041	0.00023	0.000117	4E-04	0.0421	1.33	0.0205254	0.00002	3E-05	0.0023052	0.0034	0.00749	0.026702
Ud <sup>TT</sup>	UVR <sup>VR</sup>	UVH <sup>WH</sup>	Uk <sup>k</sup>	Uu <sup>u</sup>	Uu <sup>u</sup>	U <sup>v</sup>	U <sup>v</sup>	U <sup>m</sup> icVm <sup>c</sup>	U <sup>g</sup> /G	U <sup>s</sup> /S	U <sup>s</sup> Rs	URs

Ud <sup>TT</sup>	UVR <sup>VR</sup>	UVH <sup>WH</sup>	Uk <sup>k</sup>	Uu <sup>u</sup>	Uu <sup>u</sup>	U <sup>v</sup>	U <sup>v</sup>	U <sup>m</sup> icVm <sup>c</sup>	U <sup>g</sup> /G	U <sup>s</sup> /S	U <sup>s</sup> Rs	URs
0.136	0.00027	0.000122	4E-04	0.1363	1.29	0.0246979	0.00002	3.1E-05	0.00569852	0.0034	0.00749	0.0321578
0.129	0.00027	0.000121	4E-04	0.129	1.26	0.0247671	0.00002	3.1E-05	0.00569275	0.0034	0.00749	0.0319326
0.131	0.00026	0.000121	4E-04	0.1313	1.43	0.0247238	0.00002	3.1E-05	0.0057143	0.0034	0.00749	0.031817
0.118	0.00026	0.000121	4E-04	0.1183	1.33	0.0243828	0.00002	3.1E-05	0.0055494	0.0034	0.00749	0.0314348
0.091	0.00025	0.00012	4E-04	0.0912	1.02	0.0235488	0.00002	3.1E-05	0.005637	0.0034	0.00749	0.0309324
0.084	0.00025	0.00012	4E-04	0.0848	1	0.0234917	0.00002	3.1E-05	0.0059879	0.0034	0.00749	0.0306337
0.082	0.00025	0.000119	4E-04	0.0828	1.17	0.0234917	0.00002	3.1E-05	0.0047125	0.0034	0.00749	0.0301851
0.074	0.00024	0.000119	4E-04	0.0743	1.17	0.0230326	0.00002	3.1E-05	0.0044326	0.0034	0.00749	0.029657
0.067	0.00024	0.000118	4E-04	0.0681	1.17	0.0226272	0.00002	3.1E-05	0.004	0.0034	0.00749	0.0290936
0.056	0.00024	0.000118	4E-04	0.0566	1.03	0.0217235	0.00002	3.1E-05	0.0037821	0.0034	0.00749	0.0282768
0.044	0.00023	0.000118	4E-04	0.0456	0.87	0.0208277	0.00002	3E-05	0.0036206	0.0034	0.00749	0.0275077
0.04	0.00023	0.000117	4E-04	0.0416	0.93	0.0200028	0.00002	3E-05	0.0035069	0.0034	0.00749	0.0267264
0.034	0.00023	0.000117	4E-04	0.0356	0.84	0.0189317	0.00002	3E-05	0.0031928	0.0034	0.00749	0.0258773
0.04	0.00023	0.000117	4E-04	0.0412	1.26	0.0200596	0.00002	3E-05	0.00249	0.0034	0.00749	0.0264128
0.041	0.00023	0.000117	4E-04	0.0421	1.32	0.0193464	0.00002	3E-05	0.0022841	0.0034	0.00749	0.0262521
0.052	0.00023	0.000118	4E-04	0.0533	1.28	0.021657	0.00002	3.1E-05	0.0028281	0.0034	0.00749	0.0277752
0.052	0.00023	0.000117	4E-04	0.0526	1.42	0.021657	0.00002	3.1E-05	0.0026055	0.0034	0.00749	0.027688
0.051	0.00023	0.000117	4E-04	0.0518	1.46	0.0215251	0.00002	3.1E-05	0.0025253	0.0034	0.00749	0.0275551
0.057	0.00023	0.000118	4E-04	0.0574	1.4	0.0219938	0.00002	3.1E-05	0.0029223	0.0034	0.00749	0.0280772
0.041	0.00023	0.000117	4E-04	0.0421	1.33	0.0205254	0.00002	3E-05	0.0023052	0.0034	0.00749	0.026702
Ud <sup>TT</sup>	UVR <sup>VR</sup>	UVH <sup>WH</sup>	Uk <sup>k</sup>	Uu <sup>u</sup>	Uu <sup>u</sup>	U <sup>v</sup>	U <sup>v</sup>	U <sup>m</sup> icVm <sup>c</sup>	U <sup>g</sup> /G	U <sup>s</sup> /S	U <sup>s</sup> Rs	URs

Std	1.5	L (m) 0.65000																	
		f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k (W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R*	phi
1	925	712	0.10149	6.06794	30.4	24.7	5.7	27.55	0.026196	8.637	347.594	1.58E-05	0.00952	0.1281	0.053088	3709.201	60.8272	2.31825	
2	925	1086	0.13569	8.11307	32.1	24.8	7.3	28.45	0.026292	12.03	348.113	1.598E-05	0.01452	0.1956	0.053008	3699.659	141.189	2.30604	
3	925	1174	0.16987	10.15653	35.4	24.9	10.5	30.15	0.026396	13.04	349.093	1.604E-05	0.01569	0.2121	0.052866	3653.207	164.288	2.28325	
4	925	1267	0.20379	12.18483	38.7	25	13.7	31.85	0.026599	14.32	350.07	1.62E-05	0.01694	0.2295	0.052712	3677.344	190.532	2.26084	
5	925	1350	0.23757	14.20445	41.5	25.9	15.6	33.7	0.026643	17	351.13	1.637E-05	0.01805	0.2453	0.052553	3578.97	215.316	2.23686	
6	925	1432	0.27162	16.24059	45.1	26.2	18.9	35.65	0.026794	18.25	352.244	1.655E-05	0.01914	0.261	0.052387	3539.241	241.1	2.21203	
7	925	1839	0.30566	18.26950	44.9	25.6	19.3	35.25	0.026795	22.64	352.016	1.652E-05	0.02456	0.335	0.052421	3567.332	398.019	2.21708	
8	925	2141	0.33954	20.30150	45.7	26.5	19.2	36.1	0.026817	28.04	352.501	1.66E-05	0.02862	0.3905	0.052349	3530.176	538.348	2.20636	
9	925	1519	0.16965	10.14340	34.9	25.9	9	30.4	0.026404	15.16	349.237	1.606E-05	0.02031	0.2745	0.052838	3647.897	274.86	2.27994	
10	925	1740	0.13569	8.11310	31.5	26	5.5	28.75	0.026284	15.95	348.286	1.591E-05	0.02326	0.3136	0.052982	3683.183	362.187	2.30199	
11	925	1376	0.12048	7.20377	31.3	25.6	5.7	28.45	0.026292	12.14	348.113	1.598E-05	0.01839	0.2479	0.053008	3689.659	226.682	2.30604	
12	925	1382	0.15267	9.12834	33.3	26.2	7.1	29.75	0.026356	15.6	348.863	1.6E-05	0.01847	0.2495	0.052895	3661.731	227.89	2.28858	
13	925	1315	0.18689	11.17450	36.4	25.5	10.9	30.95	0.026444	15.17	349.553	1.61E-05	0.01756	0.2378	0.052729	3656.258	205.706	2.27266	
14	925	1654	0.22108	13.21880	38.1	25.8	12.3	31.95	0.026516	18.76	350.127	1.621E-05	0.02211	0.2897	0.052703	3615.253	324.62	2.25953	
15	925	1918	0.25552	15.27770	40.2	26	14.2	33.1	0.0266	21.64	350.787	1.631E-05	0.02564	0.3481	0.052604	3591.342	435.285	2.24459	
16	925	2087	0.28888	17.26020	41.6	25.9	15.7	33.75	0.026647	24.94	351.159	1.637E-05	0.0279	0.3792	0.052549	3577.942	614.1616	2.23621	
17	925	1257	0.11098	6.63576	30.8	25.7	5.1	28.25	0.026247	11.52	347.998	1.596E-05	0.0168	0.2263	0.053026	3593.987	189.249	2.30874	
18	925	1965	0.26408	15.78960	40.1	26.2	13.9	33.15	0.026803	23.61	350.815	1.632E-05	0.02627	0.3567	0.0526	3590.308	456.802	2.24394	
19	925	1826	0.22985	13.74310	38	25.9	12.1	31.95	0.026516	20.62	350.127	1.621E-05	0.02441	0.3308	0.052703	3675.253	395.646	2.25953	
20	925	2021	0.28016	16.75240	41.1	26.1	15	33.6	0.026636	24.6	351.073	1.636E-05	0.02702	0.3671	0.052562	3561.027	482.668	2.23814	
#		f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k (W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R*	phi

Ud/T/T	UVRR/VR	UVH/VH	Uk/k	UNu/NU	UNu/NU	UTavg/Tavg	Ufff	Uv/v	Uymic/Vmic	U/G/G	U/S/S	URs/URs	URs
0.124	0.00027	0.000122	4E-04	0.1245	1.07	0.02566661	0.00002	3.2E-05	0.0070225	0.0034	0.00749	0.0335627	2.04152
0.097	0.00025	0.00012	4E-04	0.0974	1.17	0.0248541	0.00002	3.1E-05	0.0046041	0.0034	0.00749	0.0311924	4.40402
0.067	0.00025	0.000119	4E-04	0.0681	0.89	0.0234527	0.00002	3.1E-05	0.0042589	0.0034	0.00749	0.0298836	4.90953
0.052	0.00024	0.000118	4E-04	0.0526	0.75	0.0222009	0.00002	3.1E-05	0.0035463	0.0034	0.00749	0.0287336	5.47466
0.045	0.00024	0.000118	4E-04	0.0464	0.78	0.0209822	0.00002	3.1E-05	0.0031037	0.0034	0.00749	0.0276689	5.95755
0.037	0.00023	0.000117	4E-04	0.0387	0.71	0.0198345	0.00002	3E-05	0.0034916	0.0034	0.00749	0.0266949	6.43615
0.037	0.00023	0.000117	4E-04	0.038	0.86	0.0200596	0.00002	3E-05	0.0027189	0.0034	0.00749	0.0265029	10.5466
0.037	0.00023	0.000117	4E-04	0.0382	1.07	0.0195873	0.00002	3E-05	0.0023354	0.0034	0.00749	0.0259985	13.9963
0.079	0.00025	0.000119	4E-04	0.0792	1.2	0.0235599	0.00002	3.1E-05	0.0032916	0.0034	0.00749	0.0292371	8.03612
0.129	0.00025	0.000112	4E-04	0.129	2.06	0.0245948	0.00002	3.1E-05	0.0028736	0.0034	0.00749	0.0301393	10.9155
0.124	0.00026	0.000121	4E-04	0.1245	1.51	0.0248541	0.00002	3.1E-05	0.0036337	0.0034	0.00749	0.0306756	6.96298
0.1	0.00025	0.000119	4E-04	0.1001	1.56	0.0237681	0.00002	3.1E-05	0.0036179	0.0034	0.00749	0.0297947	6.78992
0.065	0.00024	0.000119	4E-04	0.0656	1	0.0228465	0.00002	3.1E-05	0.0036023	0.0034	0.00749	0.0291589	5.99815
0.057	0.00024	0.000118	4E-04	0.0584	1.09	0.0221315	0.00002	3.1E-05	0.003023	0.0034	0.00749	0.0282277	9.16327
0.05	0.00023	0.000118	4E-04	0.0508	1.1	0.0213625	0.00002	3.1E-05	0.0026069	0.0034	0.00749	0.0277588	11.9519
0.045	0.00023	0.000117	4E-04	0.0461	1.15	0.0209511	0.00002	3.1E-05	0.0023958	0.0034	0.00749	0.027062	13.9239
0.139	0.00026	0.000121	4E-04	0.139	1.6	0.0250301	0.00002	3.2E-05	0.0039777	0.0034	0.00749	0.0305878	5.86439
0.051	0.00023	0.000118	4E-04	0.0518	1.22	0.0213303	0.00002	3.1E-05	0.0025445	0.0034	0.00749	0.0274103	12.5211
0.058	0.00024	0.000118	4E-04	0.0593	1.22	0.0221315	0.00002	3.1E-05	0.0027382	0.0034	0.00749	0.0281112	11.1221
0.047	0.00023	0.000117	4E-04	0.0482	1.19	0.0210446	0.00002	3.1E-05	0.002474	0.0034	0.00749	0.0277626	13.1105
Ud/T/T	UVRR/VR	UVH/VH	Uk/k	UNu/NU	UNu/NU	UTavg/Tavg	Ufff	Uv/v	Uymic/Vmic	U/G/G	U/S/S	URs/URs	URs

Ud/T/T	UVRR/VR	UVH/VH	Uk/k	UNu/NU	UNu/NU	UTavg/Tavg	Ufff	Uv/v	Uymic/Vmic	U/G/G	U/S/S	URs/URs	URs
0.124	0.00027	0.000122	4E-04	0.1245	1.07	0.02566661	0.00002	3.2E-05	0.0070225	0.0034	0.00749	0.0335627	2.04152
0.097	0.00025	0.00012	4E-04	0.0974	1.17	0.0248541	0.00002	3.1E-05	0.0046041	0.0034	0.00749	0.0311924	4.40402
0.067	0.00025	0.000119	4E-04	0.0681	0.89	0.0234527	0.00002	3.1E-05	0.0042589	0.0034	0.00749	0.0298836	4.90953
0.052	0.00024	0.000118	4E-04	0.0526	0.75	0.0222009	0.00002	3.1E-05	0.0035463	0.0034	0.00749	0.0287336	5.47466
0.045	0.00024	0.000118	4E-04	0.0464	0.78	0.0209822	0.00002	3.1E-05	0.0031037	0.0034	0.00749	0.0276689	5.95755
0.037	0.00023	0.000117	4E-04	0.0387	0.71	0.0198345	0.00002	3E-05	0.0034916	0.0034	0.00749	0.0266949	6.43615
0.037	0.00023	0.000117	4E-04	0.038	0.86	0.0200596	0.00002	3E-05	0.0027189	0.0034	0.00749	0.0265029	10.5466
0.037	0.00023	0.000117	4E-04	0.0382	1.07	0.0195873	0.00002	3E-05	0.0023354	0.0034	0.00749	0.0259985	13.9963
0.079	0.00025	0.000119	4E-04	0.0792	1.2	0.0235599	0.00002	3.1E-05	0.0032916	0.0034	0.00749	0.0292371	8.03612
0.129	0.00025	0.000112	4E-04	0.129	2.06	0.0245948	0.00002	3.1E-05	0.0028736	0.0034	0.00749	0.0301393	10.9155
0.124	0.00026	0.000121	4E-04	0.1245	1.51	0.0248541	0.00002	3.1E-05	0.0036337	0.0034	0.00749	0.0306756	6.96298
0.1	0.00025	0.000119	4E-04	0.1001	1.56	0.0237681	0.00002	3.1E-05	0.0036179	0.0034	0.00749	0.0297947	6.78992
0.065	0.00024	0.000119	4E-04	0.0656	1	0.0228465	0.00002	3.1E-05	0.0036023	0.0034	0.00749	0.0291589	5.99815
0.057	0.00024	0.000118	4E-04	0.0584	1.09	0.0221315	0.00002	3.1E-05	0.003023	0.0034	0.00749	0.0282277	9.16327
0.05	0.00023	0.000118	4E-04	0.0508	1.1	0.0213625	0.00002	3.1E-05	0.0026069	0.0034	0.00749	0.0277588	11.9519
0.045	0.00023	0.000117	4E-04	0.0461	1.15	0.0209511	0.00002	3.1E-05	0.0023958	0.0034	0.00749	0.027062	13.9239
0.139	0.00026	0.000121	4E-04	0.139	1.6	0.0250301	0.00002	3.2E-05	0.0039777	0.0034	0.00749	0.0305878	5.86439
0.051	0.00023	0.000118	4E-04	0.0518	1.22	0.0213303	0.00002	3.1E-05	0.0025445	0.0034	0.00749	0.0274103	12.5211
0.058	0.00024	0.000118	4E-04	0.0593	1.22	0.0221315	0.00002	3.1E-05	0.0027382	0.0034	0.00749	0.0281112	11.1221
0.047	0.00023	0.000117	4E-04	0.0482	1.19	0.0210446	0.00002	3.1E-05	0.002474	0.0034	0.00749	0.0277626	13.1105
Ud/T/T	UVRR/VR	UVH/VH	Uk/k	UNu/NU	UNu/NU	UTavg/Tavg	Ufff	Uv/v	Uymic/Vmic	U/G/G	U/S/S	URs/URs	URs

Std	1.5	L (m)		0.65000		PR	epsilon	X	N/2	Rs	phi								
		#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	Ta(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)					
1	1202	1490	0.10163	6.07670	26.6	23.3	3.3	24.95	0.026006	15.07	346.088	1.555E-05	0.01992	0.2053	0.069385	4894.574	205.371	3.05911	
2	1202	1531	0.11950	7.14515	27.8	23.5	4.3	25.65	0.026057	16.98	346.494	1.562E-05	0.02047	0.2112	0.069204	4874.298	217.491	3.04644	
3	1202	1570	0.13592	8.12080	28.9	23.4	5.5	26.15	0.026094	16.99	346.783	1.567E-05	0.020999	0.2168	0.069146	4859.9	221.419	3.03144	
4	1202	1329	0.10946	6.54463	28.1	23.5	4.6	25.8	0.026068	12.51	346.581	1.563E-05	0.01777	0.1834	0.069187	4889.971	163.322	3.04373	
5	1202	1235	0.10231	6.11747	28.1	23.7	4.4	25.9	0.026076	11.42	346.639	1.564E-05	0.01651	0.1705	0.069175	4867.09	141.431	3.04193	
6	1202	790	0.08601	5.14235	28	23.8	4.2	25.9	0.026076	8.457	346.639	1.564E-05	0.01056	0.109	0.069175	4867.09	67.8716	3.04193	
7	1202	1027	0.09393	5.61624	27.9	23.7	4.2	25.8	0.026068	10.08	346.581	1.563E-05	0.01373	0.1417	0.069187	4869.971	97.8283	3.04373	
8	1202	1096	0.10385	6.19757	28.8	23.7	5.1	26.25	0.026101	10.11	346.841	1.567E-05	0.01405	0.1514	0.069135	4857.09	111.286	3.03964	
9	1202	1230	0.11237	6.71873	29	23.8	5.2	26.4	0.026112	11.64	346.928	1.569E-05	0.01644	0.1699	0.069118	4852.727	140.108	3.03295	
10	1202	1310	0.12001	7.17570	29.2	23.7	5.5	26.45	0.026116	12.58	346.957	1.569E-05	0.01751	0.181	0.069112	4851.295	168.906	3.03206	
11	1202	1392	0.12845	7.68009	29.5	23.9	5.6	26.7	0.026134	14.12	347.102	1.572E-05	0.01861	0.1924	0.06983	4844.443	178.307	3.02759	
12	1202	1429	0.13739	8.21492	30.2	24	6.2	27.1	0.026163	14.57	347.333	1.575E-05	0.0191	0.1976	0.069037	4832.736	188.773	3.02046	
13	1202	1658	0.14726	8.80450	29.7	23.9	5.8	26.8	0.026141	17.81	347.16	1.573E-05	0.02216	0.2292	0.069071	4841.287	254.318	3.0258	
14	1202	1443	0.13673	8.17529	30.2	24.1	6.1	27.15	0.026167	14.67	347.362	1.576E-05	0.01929	0.1996	0.069031	4831.313	192.665	3.01957	
15	1202	1286	0.12688	7.58623	30.2	23.9	6.3	27.05	0.02616	12.23	347.304	1.575E-05	0.01719	0.1778	0.069043	4834.16	162.002	3.02135	
16	1202	1637	0.12152	7.28600	28.3	24	4.3	26.15	0.026094	16.48	346.783	1.567E-05	0.02198	0.226	0.06946	4859.9	248.33	3.0344	
17	1202	1398	0.11482	6.88506	28.7	24	4.7	26.35	0.026108	13.45	346.899	1.568E-05	0.01889	0.1931	0.069123	4854.161	181.019	3.03385	
18	1202	1440	0.11929	7.13235	29	24.3	4.7	26.65	0.02613	14.61	347.073	1.571E-05	0.01925	0.199	0.069089	4845.572	191.911	3.02848	
19	1202	1580	0.12686	7.57281	28.9	24.3	4.6	26.6	0.026127	16.71	347.044	1.571E-05	0.02112	0.2183	0.069094	4847.002	231.071	3.02938	
20	1202	1190	0.10990	6.57095	29.3	24.1	5.2	26.7	0.026134	11.13	347.102	1.572E-05	0.01591	0.1645	0.069083	4844.143	131.043	3.02759	
#		f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	Ta(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N/2	Rs	phi

UdT/T	UVR/NR	UVH/NH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvnic/Vnic	Ug/G	Us/S	URs/URs	URs
0.214	0.00027	0.000122	4E-04	0.2145	3.23	0.0283407	0.00002	3.2E-05	0.0035557	0.0034	0.00749	0.0334467	6.90242
0.164	0.00026	0.000121	4E-04	0.1647	2.63	0.0275673	0.00002	3.2E-05	0.0032658	0.0034	0.00749	0.0327576	7.12449
0.129	0.00025	0.00012	4E-04	0.129	2.08	0.0270402	0.00002	3.2E-05	0.0031847	0.0034	0.00749	0.0322829	7.37402
0.154	0.00026	0.000121	4E-04	0.154	1.93	0.027407	0.00002	3.2E-05	0.0037622	0.0034	0.00749	0.0328356	5.37928
0.161	0.00027	0.000122	4E-04	0.161	1.84	0.0273012	0.00002	3.2E-05	0.0040486	0.0034	0.00749	0.0328841	4.65084
0.168	0.00028	0.000123	4E-04	0.1687	1.43	0.0273012	0.00002	3.2E-05	0.0053291	0.0034	0.00749	0.0342933	1.98461
0.168	0.00027	0.000122	4E-04	0.1687	1.7	0.027407	0.00002	3.2E-05	0.0048685	0.0034	0.00749	0.0334126	3.26869
0.139	0.00027	0.000121	4E-04	0.139	1.4	0.02585371	0.00002	3.2E-05	0.004552	0.0034	0.00749	0.0328528	3.65607
0.136	0.00026	0.000121	4E-04	0.1363	1.59	0.0267841	0.00002	3.2E-05	0.004085	0.0034	0.00749	0.0324643	4.54852
0.129	0.00026	0.000121	4E-04	0.129	1.62	0.0267335	0.00002	3.2E-05	0.0038168	0.0034	0.00749	0.0323016	5.13293
0.126	0.00026	0.00012	4E-04	0.1267	1.79	0.0264831	0.00002	3.2E-05	0.003592	0.0034	0.00749	0.0319908	5.73618
0.114	0.00025	0.00012	4E-04	0.1145	1.67	0.0266923	0.00002	3.2E-05	0.003499	0.0034	0.00749	0.0316263	5.97018
0.122	0.00025	0.00012	4E-04	0.1223	2.19	0.0263843	0.00002	3.2E-05	0.0030157	0.0034	0.00749	0.0316595	8.05412
0.116	0.00025	0.00012	4E-04	0.1164	1.71	0.0260442	0.00002	3.2E-05	0.003465	0.0034	0.00749	0.0315717	6.07644
0.112	0.00026	0.00012	4E-04	0.1127	1.38	0.0261405	0.00002	3.2E-05	0.003898	0.0034	0.00749	0.0318471	4.86947
0.164	0.00026	0.000121	4E-04	0.1647	2.72	0.0270402	0.00002	3.2E-05	0.0030544	0.0034	0.00749	0.0322325	8.0043
0.15	0.00026	0.000121	4E-04	0.1508	2.03	0.0266349	0.00002	3.2E-05	0.0035765	0.0034	0.00749	0.0322758	5.84252
0.15	0.00026	0.000121	4E-04	0.1508	2.19	0.0265328	0.00002	3.2E-05	0.0034722	0.0034	0.00749	0.0319791	6.13714
0.154	0.00026	0.00012	4E-04	0.154	2.57	0.0265827	0.00002	3.2E-05	0.0031646	0.0034	0.00749	0.0318927	7.36947
0.136	0.00026	0.000121	4E-04	0.1363	1.52	0.0264831	0.00002	3.2E-05	0.0042017	0.0034	0.00749	0.0322855	4.23092

UdT/T	UVR/NR	UVH/NH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvnic/Vnic	Ug/G	Us/S	URs/URs	URs
0.15	0.00026	0.000121	4E-04	0.1508	2.19	0.0265328	0.00002	3.2E-05	0.0034722	0.0034	0.00749	0.0319791	6.13714
0.154	0.00026	0.00012	4E-04	0.154	2.57	0.0265827	0.00002	3.2E-05	0.0031646	0.0034	0.00749	0.0318927	7.36947
0.136	0.00026	0.000121	4E-04	0.1363	1.52	0.0264831	0.00002	3.2E-05	0.0042017	0.0034	0.00749	0.0322855	4.23092

Std	1.5	L [m]										0.65000									
		#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi	
1	1461	905	0.05172	3.09214	26.4	25.1	1.3	25.75	0.0280655	9.883	346.592	1.563E-05	0.0121	0.1027	0.084102	5921.077	62.6073	3.70667			
2	1461	736	0.04247	2.53922	26.2	25.1	1.1	25.65	0.028057	7.879	346.494	1.562E-05	0.00984	0.0835	0.084116	5924.584	41.3524	3.70287			
3	1461	1087	0.05965	3.56659	27	25.3	1.7	26.15	0.028094	10.04	346.783	1.567E-05	0.01453	0.1235	0.084046	5907.083	80.8336	3.69193			
4	1461	734	0.04202	2.51270	26.2	25.2	1	25.7	0.028061	8.485	346.523	1.562E-05	0.00981	0.0833	0.084109	5922.83	41.1227	3.70177			
5	1461	1137	0.06813	4.07351	27.4	25.2	2.2	26.3	0.028105	10.12	346.87	1.568E-05	0.0152	0.1292	0.084025	5901.85	98.5236	3.68866			
6	1461	540	0.03443	2.05863	26.6	25.2	1.4	25.9	0.028076	4.066	346.639	1.564E-05	0.00722	0.0613	0.084081	5915.823	22.2461	3.69739			
7	1461	868	0.04226	2.52654	26.6	25.6	1	26.1	0.02609	8.569	346.754	1.566E-05	0.0116	0.0986	0.084053	5908.83	57.4489	3.69302			
8	1461	1065	0.05294	3.16550	26.9	25.6	1.3	25.25	0.028101	10.34	346.841	1.567E-05	0.01424	0.121	0.084032	5903.593	86.4519	3.68975			
9	1461	998	0.05941	3.55224	27	25.4	1.6	26.2	0.028098	10.58	346.812	1.567E-05	0.01334	0.1134	0.084039	5905.398	75.9283	3.69004			
10	1461	1114	0.06901	4.12636	27.4	25.4	2	26.4	0.028112	11.42	346.928	1.569E-05	0.01489	0.1266	0.084011	5908.365	94.5536	3.68648			
11	1461	562	0.03397	2.03087	26.6	25.8	0.8	26.2	0.028098	6.919	346.812	1.567E-05	0.0075	0.0639	0.084039	5905.338	24.0771	3.69084			
12	1461	640	0.03844	2.29816	26.4	25.4	1	25.9	0.028076	7.094	346.639	1.564E-05	0.00856	0.0727	0.084081	5915.823	31.2483	3.69739			
13	1461	1063	0.05093	3.04512	26.8	25.7	1.1	26.25	0.028101	11.31	346.841	1.567E-05	0.01421	0.1208	0.084032	5903.593	86.1275	3.68975			
14	1461	922	0.05896	3.52552	27.1	25.6	1.5	26.35	0.028108	11.12	346.899	1.568E-05	0.01232	0.1048	0.084018	5900.107	64.7777	3.68757			
15	1461	1163	0.06878	4.11251	28	26	2	27	0.028156	11.32	347.275	1.574E-05	0.01555	0.1323	0.083927	5877.527	102.886	3.67345			
16	1461	611	0.03374	2.01735	26.5	25.4	1.1	25.95	0.028079	4.969	346.668	1.565E-05	0.00817	0.0694	0.084074	5914.073	28.4769	3.6963			
17	1461	708	0.04356	2.60476	26.6	25.6	1	26.1	0.02809	9.108	346.754	1.566E-05	0.00946	0.0804	0.084053	5908.83	38.2216	3.69302			
18	1461	1088	0.05361	3.20528	26.7	25.5	1.2	26.1	0.028099	11.49	346.754	1.566E-05	0.01454	0.1236	0.084053	5908.83	90.281	3.69302			
19	1461	1104	0.07013	4.19291	27.9	25.6	2.3	26.75	0.028138	10.24	347.131	1.572E-05	0.01476	0.1255	0.083962	5886.195	92.7804	3.67887			
20	1461	1002	0.05941	3.55214	26.9	25.4	1.5	26.15	0.028094	11.28	346.783	1.567E-05	0.01339	0.1138	0.084046	5907.083	76.5459	3.69193			
#		f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi		

Ud/T	UVR/NR	UVH/NH	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/l/f	U/v/v	Uvmic/Vmic	U/g/G	U/s/S	URs/URs	URs
0.544	0.00039	0.000128	4E-04	0.544	5.38	0.0274602	0.00002	3.2E-05	0.0055249	0.0034	0.00749	0.0338616	2.11659
0.643	0.00035	0.000131	4E-04	0.6429	5.07	0.0275673	0.00002	3.2E-05	0.0067935	0.0034	0.00749	0.0348589	1.44142
0.416	0.00031	0.000126	4E-04	0.4161	4.18	0.0270402	0.00002	3.2E-05	0.0045998	0.0034	0.00749	0.0329583	2.969
0.707	0.00035	0.000131	4E-04	0.7072	6	0.0275136	0.00002	3.2E-05	0.006812	0.0034	0.00749	0.034839	1.43226
0.321	0.0003	0.000125	4E-04	0.3216	3.25	0.0268859	0.00002	3.2E-05	0.0043975	0.0034	0.00749	0.0327208	3.22377
0.505	0.00038	0.000134	4E-04	0.5052	2.05	0.0273012	0.00002	3.2E-05	0.0092593	0.0034	0.00749	0.0368861	0.82001
0.707	0.00035	0.000131	4E-04	0.7072	6.06	0.027032	0.00002	3.2E-05	0.0057604	0.0034	0.00749	0.0337216	1.93727
0.544	0.00032	0.000128	4E-04	0.544	5.63	0.0269371	0.00002	3.2E-05	0.0046948	0.0034	0.00749	0.0329275	2.84665
0.442	0.00031	0.000126	4E-04	0.4421	4.68	0.0268865	0.00002	3.2E-05	0.00501	0.0034	0.00749	0.0331546	2.51731
0.354	0.0003	0.000125	4E-04	0.3537	4.04	0.0267841	0.00002	3.2E-05	0.0044893	0.0034	0.00749	0.0326866	3.09064
0.884	0.00039	0.000135	4E-04	0.8839	6.12	0.0268865	0.00002	3.2E-05	0.0088688	0.0034	0.00749	0.036269	0.87325
0.707	0.00037	0.000132	4E-04	0.7072	5.02	0.0273012	0.00002	3.2E-05	0.0078125	0.0034	0.00749	0.0354956	1.10918
0.643	0.00033	0.000128	4E-04	0.6429	7.27	0.0269371	0.00002	3.2E-05	0.0047037	0.0034	0.00749	0.0328326	2.8364
0.471	0.00031	0.000126	4E-04	0.4715	5.24	0.0268349	0.00002	3.2E-05	0.005423	0.0034	0.00749	0.0328286	2.15642
0.354	0.0003	0.000125	4E-04	0.3537	4.01	0.0261889	0.00002	3.2E-05	0.0042992	0.0034	0.00749	0.0320973	3.30269
0.643	0.00039	0.000135	4E-04	0.6429	3.19	0.0272486	0.00002	3.2E-05	0.0081833	0.0034	0.00749	0.0357882	1.01914
0.707	0.00035	0.00013	4E-04	0.7072	6.44	0.027092	0.00002	3.2E-05	0.0070621	0.0034	0.00749	0.0346875	1.32619
0.589	0.00032	0.000127	4E-04	0.5893	6.77	0.027052	0.00002	3.2E-05	0.0045956	0.0034	0.00749	0.0329985	2.97847
0.307	0.0003	0.000125	4E-04	0.3076	3.15	0.0264336	0.00002	3.2E-05	0.004529	0.0034	0.00749	0.0324227	3.00619
0.471	0.00031	0.000126	4E-04	0.4715	5.32	0.0270402	0.00002	3.2E-05	0.00499	0.0034	0.00749	0.0331846	2.54015
Ud/T	UVR/NR	UVH/NH	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/l/f	U/v/v	Uvmic/Vmic	U/g/G	U/s/S	URs/URs	URs

#	Std	1.75	L (m)	0.24000	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	V (m^2/s)	PR	epsilon	X	A^2	R <sub>8</sub>	phi
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	V (m^2/s)	PR	epsilon	X	A^2	R <sub>8</sub>	phi
1	383	501	0.13851	8.26906	36.7	24.6	12.1	30.65	0.026422	7.902	349.381	1.67E-05	0.0067	0.21874	0.02187	1508.23	72.17	2.120852
2	383	600	0.14713	8.78367	35.9	24.7	11.2	30.3	0.026396	9.154	349.179	1.61E-05	0.00802	0.26182	0.02188	1511.31	103.8	2.125273
3	383	659	0.15577	9.29953	35	24.6	10.4	29.8	0.026356	11.07	348.892	1.6E-05	0.00934	0.30477	0.0219	1515.71	140.8	2.131471
4	383	801	0.16419	9.80238	34.1	24.5	9.6	29.3	0.026324	13.34	348.604	1.6E-05	0.01071	0.34095	0.02192	1520.14	186.1	2.137698
5	383	900	0.17283	10.31814	34	24.4	9.6	29.2	0.026316	14.78	348.546	1.59E-05	0.01203	0.39201	0.02192	1521.03	233.7	2.138948
6	383	1000	0.18170	10.84775	34.2	24.2	10	29.2	0.026316	15.68	348.546	1.59E-05	0.01337	0.43357	0.02192	1521.03	288.6	2.138648
7	383	1103	0.19057	11.37717	34.5	24.3	10.2	29.4	0.026331	16.81	348.661	1.6E-05	0.01474	0.48059	0.02191	1519.25	350.9	2.138541
8	383	1198	0.19881	11.86910	34	24.3	9.7	29.15	0.026313	19.36	348.517	1.59E-05	0.01601	0.52177	0.02192	1521.47	414.2	2.139573
9	383	1203	0.20749	12.38750	33.9	24.3	9.6	29.1	0.026309	21.31	348.488	1.59E-05	0.01742	0.56746	0.02192	1521.92	490.1	2.140198
10	383	1403	0.21606	12.89925	34	24.5	9.5	28.25	0.02632	23.34	348.575	1.6E-05	0.01875	0.61116	0.02192	1520.59	668	2.138323
11	383	1489	0.22494	13.42950	33.5	24.4	9.1	28.95	0.026298	26.43	348.402	1.59E-05	0.02004	0.65265	0.02193	1523.25	648.8	2.142076
12	383	1597	0.24059	14.36330	34.2	24.4	9.8	29.3	0.026324	28.05	348.604	1.6E-05	0.02135	0.69372	0.02192	1520.14	733.8	2.137689
13	383	1689	0.25020	14.93760	34.8	24.4	10.4	29.6	0.026345	28.57	348.776	1.6E-05	0.02271	0.74053	0.02191	1517.48	832.2	2.133958
14	383	1802	0.25867	15.44270	34.8	24.3	10.5	29.55	0.026342	30.24	348.748	1.6E-05	0.02409	0.78535	0.02191	1517.92	933.2	2.134581
15	383	1895	0.26758	15.97480	34.8	24.4	10.4	29.6	0.026345	32.67	348.776	1.6E-05	0.02533	0.82595	0.02191	1517.48	1035	2.133958
16	383	1997	0.27625	16.49280	34.3	24.2	10.1	29.25	0.02632	35.89	348.575	1.6E-05	0.02669	0.865991	0.02192	1520.59	1151	2.138323
17	383	2096	0.28493	17.01080	34.7	24.2	10.5	29.45	0.026335	36.71	348.69	1.6E-05	0.02802	0.91334	0.02191	1518.81	1267	2.135827
18	383	2205	0.28410	17.55820	35.1	24.2	10.9	29.95	0.026349	37.65	348.805	1.6E-05	0.02948	0.96115	0.0219	1517.04	1401	2.133326
19	383	2268	0.30354	18.12160	35.4	24.2	11.2	29.8	0.026356	39.02	348.892	1.6E-05	0.03072	1.00194	0.0219	1515.71	1622	2.131471
20	383	2397	0.31225	18.64180	35.7	24.2	11.5	29.95	0.026371	40.2	348.978	1.6E-05	0.03204	1.04536	0.02189	1514.39	1655	2.129608
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	V (m^2/s)	PR	epsilon	X	A^2	R <sub>8</sub>	phi

Ud/T/T	UVR/R	UVH/VH	Uk/k	Uu/u	Uu/u	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	Ug/g	Us/s	Urs/Rs	Urs
0.0584	0.00025	0.0001	0.00038	0.05929	0.4448	0.02307015	0.00002	3.1E-05	0.00998	0.0034	0.0074867	0.03466	2.50108
0.0631	0.00025	0.0001	0.00038	0.06392	0.5852	0.02333663	0.00002	3.1E-05	0.0083333	0.0034	0.0074867	0.03306	3.42473
0.068	0.00025	0.0001	0.00038	0.06872	0.7605	0.02372819	0.00002	3.1E-05	0.0071531	0.0034	0.0074867	0.03222	4.53507
0.0737	0.00025	0.0001	0.00038	0.07433	0.9914	0.02413311	0.00002	3.1E-05	0.0062422	0.0034	0.0074867	0.03176	5.8769
0.0737	0.00024	0.0001	0.00038	0.07433	1.0988	0.02421575	0.00002	3.1E-05	0.0055556	0.0034	0.0074867	0.03131	7.31852
0.0707	0.00024	0.0001	0.00038	0.07142	1.1201	0.02421575	0.00002	3.1E-05	0.005	0.0034	0.0074867	0.03093	8.92646
0.0693	0.00024	0.0001	0.00038	0.07004	1.1841	0.02405102	0.00002	3.1E-05	0.0045331	0.0034	0.0074867	0.03051	10.7074
0.0729	0.00024	0.0001	0.00038	0.07358	1.4246	0.02495729	0.00002	3.1E-05	0.0041736	0.0034	0.0074867	0.03047	12.6219
0.0737	0.00024	0.0001	0.00038	0.07433	1.5842	0.02429897	0.00002	3.1E-05	0.0038373	0.0034	0.0074867	0.03033	14.8628
0.0744	0.00024	0.0001	0.00038	0.0751	1.7531	0.02417436	0.00002	3.1E-05	0.0035538	0.0034	0.0074867	0.03039	17.0922
0.0777	0.00024	0.0001	0.00038	0.07835	2.0711	0.02442487	0.00002	3.1E-05	0.0033356	0.0034	0.0074867	0.03019	19.5894
0.0722	0.00023	0.0001	0.00038	0.07284	2.0434	0.02413311	0.00002	3.1E-05	0.0031309	0.0034	0.0074867	0.02987	21.9763
0.068	0.00023	0.0001	0.00038	0.06872	1.9631	0.02368681	0.00002	3.1E-05	0.0029429	0.0034	0.0074867	0.02959	24.626
0.0673	0.00023	0.0001	0.00038	0.06808	2.0591	0.02392893	0.00002	3.1E-05	0.0027747	0.0034	0.0074867	0.02956	27.6768
0.068	0.00023	0.0001	0.00038	0.06872	2.2452	0.02388851	0.00002	3.1E-05	0.0026385	0.0034	0.0074867	0.02948	30.5165
0.07	0.00023	0.0001	0.00038	0.07072	2.5384	0.02417436	0.00002	3.1E-05	0.0025038	0.0034	0.0074867	0.02966	34.1335
0.0673	0.00023	0.0001	0.00038	0.06808	2.4992	0.02401019	0.00002	3.1E-05	0.0023855	0.0034	0.0074867	0.02949	37.3636
0.0649	0.00023	0.0001	0.00038	0.06554	2.4715	0.02384823	0.00002	3.1E-05	0.0022876	0.0034	0.0074867	0.02932	41.0928
0.0631	0.00023	0.0001	0.00038	0.06392	2.4941	0.02372819	0.00002	3.1E-05	0.0021758	0.0034	0.0074867	0.0292	44.4244
0.0615	0.00023	0.0001	0.00038	0.0623	2.5041	0.02360935	0.00002	3.1E-05	0.0020859	0.0034	0.0074867	0.02907	48.113
Ud/T/T	UVR/R	UVH/VH	Uk/k	Uu/u	Uu/u	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	Ug/g	Us/s	Urs/Rs	Urs

Ud/T/T	UVR/R	UVH/VH	Uk/k	Uu/u	Uu/u	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	Ug/g	Us/s	Urs/Rs	Urs
0.0584	0.00025	0.0001	0.00038	0.05929	0.4448	0.02307015	0.00002	3.1E-05	0.00998	0.0034	0.0074867	0.03466	2.50108
0.0631	0.00025	0.0001	0.00038	0.06392	0.5852	0.02333663	0.00002	3.1E-05	0.0083333	0.0034	0.0074867	0.03306	3.42473
0.068	0.00025	0.0001	0.00038	0.06872	0.7605	0.02372819	0.00002	3.1E-05	0.0071531	0.0034	0.0074867	0.03222	4.53507
0.0737	0.00025	0.0001	0.00038	0.07433	0.9914	0.02413311	0.00002	3.1E-05	0.0062422	0.0034	0.0074867	0.03176	5.8769
0.0737	0.00024	0.0001	0.00038	0.07433	1.0988	0.02421575	0.00002	3.1E-05	0.0055556	0.0034	0.0074867	0.03131	7.31852
0.0707	0.00024	0.0001	0.00038	0.07142	1.1201	0.02421575	0.00002	3.1E-05	0.005	0.0034	0.0074867	0.03093	8.92646
0.0693	0.00024	0.0001	0.00038	0.07004	1.1841	0.02405102	0.00002	3.1E-05	0.0045331	0.0034	0.0074867	0.03051	10.7074
0.0729	0.00024	0.0001	0.00038	0.07358	1.4246	0.02495729	0.00002	3.1E-05	0.0041736	0.0034	0.0074867	0.03047	12.6219
0.0737	0.00024	0.0001	0.00038	0.07433	1.5842	0.02429897	0.00002	3.1E-05	0.0038373	0.0034	0.0074867	0.03033	14.8628
0.0744	0.00024	0.0001	0.00038	0.0751	1.7531	0.02417436	0.00002	3.1E-05	0.0035538	0.0034	0.0074867	0.03039	17.0922
0.0777	0.00024	0.0001	0.00038	0.07835	2.0711	0.02442487	0.00002	3.1E-05	0.0033356	0.0034	0.0074867	0.03019	19.5894
0.0722	0.00023	0.0001	0.00038	0.07284	2.0434	0.02413311	0.00002	3.1E-05	0.0031309	0.0034	0.0074867	0.02987	21.9763
0.068	0.00023	0.0001	0.00038	0.06872	1.9631	0.02368681	0.00002	3.1E-05	0.0029429	0.0034	0.0074867	0.02959	24.626
0.0673	0.00023	0.0001	0.00038	0.06808	2.0591	0.02392893	0.00002	3.1E-05	0.0027747	0.0034	0.0074867	0.02956	27.6768
0.068	0.00023	0.0001	0.00038	0.06872	2.2452	0.02388851	0.00002	3.1E-05	0.0026385	0.0034	0.0074867	0.02948	30.5165
0.07	0.00023	0.0001	0.00038	0.07072	2.5384	0.02417436	0.00002	3.1E-05	0.0025038	0.0034	0.0074867	0.02966	34.1335
0.0673	0.00023	0.0001	0.00038	0.06808	2.4992	0.02401019	0.00002	3.1E-05	0.0023855	0.0034	0.0074867	0.02949	37.3636
0.0649	0.00023	0.0001	0.00038	0.06554	2.4715	0.02384823	0.00002	3.1E-05	0.0022876	0.0034	0.0074867	0.02932	41.0928
0.0631	0.00023	0.0001	0.00038	0.06392	2.4941	0.02372819	0.00002	3.1E-05	0.0021758	0.0034	0.0074867	0.0292	44.4244
0.0615	0.00023	0.0001	0.00038	0.0623	2.5041	0.02360935	0.00002	3.1E-05	0.0020859	0.0034	0.0074867	0.02907	48.113
Ud/T/T	UVR/R	UVH/VH	Uk/k	Uu/u	Uu/u	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	Ug/g	Us/s	Urs/Rs	Urs

Sud	1.75	L(m)	0.65	#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltat(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	n^2	Rs	phi
	1.75																					
1	676	911	0.10389	6.20193	30.1	25	5.1	27.55	0.026196	10.1	347.594	1.50E-05	0.01218	0.2242	0.0388	2710.72	136.3	3.181956				
2	676	1043	0.12098	7.22158	30.9	25.1	5.8	28	0.026229	12.03	347.854	1.59E-05	0.01394	0.25988	0.03877	2703.57	178.4	3.301993				
3	676	1174	0.13828	8.25436	31.3	25.2	6.1	28.25	0.026247	14.93	347.998	1.59E-05	0.01569	0.28927	0.03875	2699.61	228.9	3.396321				
4	676	1306	0.15560	9.28872	31.6	25.2	6.4	28.4	0.026258	18.01	348.084	1.59E-05	0.01746	0.32187	0.03874	2697.23	278.4	3.392984				
5	676	1497	0.17314	10.33550	32.3	25.4	6.9	28.85	0.026291	20.66	348.344	1.59E-05	0.02001	0.36922	0.03871	2690.14	366.7	3.383003				
6	676	1755	0.19921	11.35430	32.5	25.4	7.1	28.95	0.026298	24.22	348.402	1.59E-05	0.02346	0.43292	0.03871	2688.56	503.9	3.380791				
7	676	1813	0.20759	12.39210	33.4	25.6	7.6	29.5	0.026308	26.22	348.719	1.6E-05	0.02424	0.44764	0.03867	2679.94	637	3.368863				
8	676	1853	0.22490	13.42530	34.9	25.7	9.2	30.3	0.026396	28.04	349.179	1.61E-05	0.02477	0.45812	0.03862	2667.47	559.8	3.351135				
9	676	2041	0.24223	14.45950	35.3	25.7	9.6	30.5	0.026411	28.93	349.294	1.61E-05	0.02728	0.50476	0.03861	2664.37	678.8	3.346774				
10	676	2041	0.25976	15.50640	36.6	25.8	10.8	31.2	0.026462	28.52	349.697	1.61E-05	0.02728	0.50534	0.03856	2653.57	677.8	3.331576				
11	676	2367	0.27709	16.54060	36.5	25.9	10.6	31.2	0.026462	34.22	349.697	1.61E-05	0.03164	0.58806	0.03856	2653.57	911.4	3.331516				
12	676	2534	0.27709	16.54060	36.3	26.1	10.2	31.2	0.026462	35.56	349.697	1.61E-05	0.03387	0.62741	0.03856	2653.57	1045	3.331576				
13	676	2307	0.22515	13.34000	33.4	26.1	7.3	29.75	0.026336	32.94	348.863	1.5E-05	0.03084	0.56984	0.03866	2676.03	868	3.363171				
14	676	2254	0.21626	12.90970	33.2	26.3	6.9	29.75	0.026336	32.16	348.863	1.6E-05	0.03013	0.55675	0.03866	2676.03	828.5	3.363171				
15	676	2040	0.19918	11.89020	33.1	26.4	6.7	29.75	0.026336	28.09	348.863	1.6E-05	0.02727	0.50389	0.03866	2676.03	679.5	3.363171				
16	676	2111	0.19918	11.89020	32.8	26.5	6.3	29.65	0.026349	28.88	348.805	1.6E-05	0.02822	0.52134	0.03866	2677.59	727.8	3.365366				
17	676	1326	0.13043	7.78600	30.8	26.6	4.2	28.7	0.026238	19.27	348.258	1.59E-05	0.01773	0.32956	0.03872	2692.5	287.8	3.386326				
18	676	1726	0.14752	8.80630	30.9	26.3	4.6	28.6	0.026213	22.61	348.2	1.59E-05	0.02307	0.42552	0.03873	2694.07	487.8	3.388543				
19	676	1644	0.13932	8.31652	30.6	26.2	4.4	28.4	0.026258	21	348.084	1.59E-05	0.02198	0.40517	0.03874	2697.23	442.8	3.392984				
20	676	1886	0.15117	9.02370	30.5	26.4	4.1	28.45	0.026262	26.53	348.113	1.59E-05	0.02521	0.46485	0.03874	2696.44	582.7	3.391873				
#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltat(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	n^2	Rs	phi				

Ugat/It	Uvr/vr	Uvh/vh	Ujk/k	Unu/nu	Unu/nu	Utgat/avg	Uff	Uvv/v	Uvmic/vmic	Ug/g	Us/s	Urs/irs	Urs
0.1386	0.00027	0.0001	0.00038	0.13901	1.404	0.02566606	0.00002	3.2E-05	0.0054885	0.0034	0.0074867	0.0324	4.41468
0.1219	0.00026	0.0001	0.00038	0.12232	1.4711	0.02525557	0.00002	3.2E-05	0.0047939	0.0034	0.0074867	0.03162	5.64193
0.1159	0.00025	0.0001	0.00038	0.11635	1.737	0.02503009	0.00002	3.2E-05	0.0042589	0.0034	0.0074867	0.03114	7.03346
0.1105	0.00025	0.0001	0.00038	0.11094	1.9981	0.02489789	0.00002	3.1E-05	0.0038285	0.0034	0.0074867	0.03081	8.60809
0.1026	0.00024	0.0001	0.00038	0.10297	2.1271	0.02450953	0.00002	3.1E-05	0.003334	0.0034	0.0074867	0.03026	11.0978
0.0956	0.00024	0.0001	0.00038	0.10009	2.4245	0.02442487	0.00002	3.1E-05	0.002849	0.0034	0.0074867	0.02999	15.1125
0.0907	0.00024	0.0001	0.00038	0.09121	2.3917	0.02396549	0.00002	3.1E-05	0.0027579	0.0034	0.0074867	0.02959	15.8884
0.0768	0.00024	0.0001	0.00038	0.07751	2.0181	0.02333663	0.00002	3.1E-05	0.0026983	0.0034	0.0074867	0.02905	16.2655
0.0737	0.00023	0.0001	0.00038	0.07433	2.1504	0.02318361	0.00002	3.1E-05	0.0024498	0.0034	0.0074867	0.02884	19.58
0.0655	0.00023	0.0001	0.00038	0.06623	1.9549	0.02266346	0.00002	3.1E-05	0.0024498	0.0034	0.0074867	0.02843	19.2633
0.0667	0.00023	0.0001	0.00038	0.06746	2.3082	0.02266346	0.00002	3.1E-05	0.0021124	0.0034	0.0074867	0.02832	25.8096
0.0693	0.00023	0.0001	0.00038	0.07004	2.4907	0.02266346	0.00002	3.1E-05	0.0019732	0.0034	0.0074867	0.02828	29.538
0.0966	0.00024	0.0001	0.00038	0.09738	3.2072	0.02376807	0.00002	3.1E-05	0.0021673	0.0034	0.0074867	0.02923	25.3962
0.1025	0.00024	0.0001	0.00038	0.10297	3.3103	0.02376807	0.00002	3.1E-05	0.0022183	0.0034	0.0074867	0.02924	24.2554
0.1055	0.00024	0.0001	0.00038	0.10801	2.9774	0.02376807	0.00002	3.1E-05	0.002451	0.0034	0.0074867	0.02932	19.9187
0.1122	0.00024	0.0001	0.00038	0.11268	3.3687	0.02384823	0.00002	3.1E-05	0.0023885	0.0034	0.0074867	0.02935	21.3624
0.1684	0.00026	0.0001	0.00038	0.16865	3.2486	0.02463763	0.00002	3.1E-05	0.0037707	0.0034	0.0074867	0.03057	8.79829
0.1537	0.00025	0.0001	0.00038	0.15404	3.4677	0.02472378	0.00002	3.1E-05	0.0028569	0.0034	0.0074867	0.03025	14.7581
0.1607	0.00025	0.0001	0.00038	0.16102	3.3815	0.02469789	0.00002	3.1E-05	0.0030414	0.0034	0.0074867	0.03045	13.484
0.1725	0.00025	0.0001	0.00038	0.17275	4.5831	0.02485413	0.00002	3.1E-05	0.0026511	0.0034	0.0074867	0.03027	17.6375
Ugat/It	Uvr/vr	Uvh/vh	Ujk/k	Unu/nu	Unu/nu	Utgat/avg	Uff	Uvv/v	Uvmic/vmic	Ug/g	Us/s	Urs/irs	Urs

Ugat/It	Uvr/vr	Uvh/vh	Ujk/k	Unu/nu	Unu/nu	Utgat/avg	Uff	Uvv/v	Uvmic/vmic	Ug/g	Us/s	Urs/irs	Urs
0.02566606	0.00002	3.2E-05	0.0054885	0.0034	0.0074867	0.0324	4.41468						
0.02525557	0.00002	3.2E-05	0.0047939	0.0034	0.0074867	0.03162	5.64193						
0.02503009	0.00002	3.2E-05	0.0042589	0.0034	0.0074867	0.03114	7.03346						
0.02489789	0.00002	3.1E-05	0.0038285	0.0034	0.0074867	0.03081	8.60809						
0.02450953	0.00002	3.1E-05	0.003334	0.0034	0.0074867	0.03026	11.0978						
0.02442487	0.00002	3.1E-05	0.002849	0.0034	0.0074867	0.02999	15.1125						
0.02396549	0.00002	3.1E-05	0.0027579	0.0034	0.0074867	0.02959	15.8884						
0.02333663	0.00002	3.1E-05	0.0026983	0.0034	0.0074867	0.02905	16.2655						
0.02318361	0.00002	3.1E-05	0.0024498	0.0034	0.0074867	0.02884	19.58						
0.02266346	0.00002	3.1E-05	0.0024498	0.0034	0.0074867	0.02843	19.2633						
0.02266346	0.00002	3.1E-05	0.0021124	0.0034	0.0074867	0.02832	25.8096						
0.02266346	0.00002	3.1E-05	0.0019732	0.0034	0.0074867	0.02828	29.538						
0.02376807	0.00002	3.1E-05	0.0021673	0.0034	0.0074867	0.02923	25.3962						
0.02376807	0.00002	3.1E-05	0.0022183	0.0034	0.0074867	0.02924	24.2554						
0.02376807	0.00002	3.1E-05	0.002451	0.0034	0.0074867	0.02932	19.9187						
0.02384823	0.00002	3.1E-05	0.0023885	0.0034	0.0074867	0.02935	21.3624						
0.02463763	0.00002	3.1E-05	0.0037707	0.0034	0.0074867	0.03057	8.79829						
0.02472378	0.00002	3.1E-05	0.0028569	0.0034	0.0074867	0.03025	14.7581						
0.02469789	0.00002	3.1E-05	0.0030414	0.0034	0.0074867	0.03045	13.484						
0.02485413	0.00002	3.1E-05	0.0026511	0.0034	0.0074867	0.03027	17.6375						

Svd	1.75		L [m]		0.60000		L [m]		1.75		L [m]		1.75		L [m]		1.75		
	#	f [Hz]	Vmfc [mV]	VR [V]	VH [V]	TH [C]	TA[C]	deltaT[C]	Tavg [C]	k[W/mK]	Nu	c [m/s]	v [m^2/s]	PR	epsilon	X	N^2	Rs	phi
1	723	1300	0.10447	6.23637	29.3	26.3	3	27.8	0.026214	17.35	347.738	1.58E-05	0.01738	0.29926	0.04148	2894.94	259.3	4.071003	
2	723	1018	0.10447	6.23626	30.7	26.3	4.4	28.5	0.026265	11.81	348.142	1.59E-05	0.01361	0.23482	0.04143	2883.07	168.7	4.05322	
3	723	1274	0.12098	7.21591	30.6	26.5	4.1	28.55	0.026269	16.96	348.171	1.59E-05	0.01703	0.29364	0.04143	2882.23	248.5	4.053134	
4	723	1290	0.13043	7.78585	30.9	26.4	4.5	28.65	0.026276	17.98	348.229	1.59E-05	0.01724	0.29738	0.04142	2880.54	254.7	4.050762	
5	723	1455	0.14694	8.76550	31.5	26.4	5.1	28.95	0.026298	20.1	348.402	1.59E-05	0.01945	0.33559	0.0414	2875.49	323.8	4.043657	
6	723	1780	0.16437	9.81204	32	26.4	5.6	29.2	0.026316	22.92	348.546	1.59E-05	0.02379	0.41071	0.04138	2871.29	484.3	4.037752	
7	723	1860	0.18280	10.91234	32.9	26.5	6.4	29.7	0.026353	24.77	348.834	1.6E-05	0.02486	0.42953	0.04135	2862.92	528.2	4.025985	
8	723	2069	0.19919	11.889073	33.4	26.6	6.8	30	0.026375	27.66	349.007	1.6E-05	0.02766	0.47803	0.04133	2857.92	653.1	4.016952	
9	723	2143	0.21651	12.92445	34.2	26.6	7.6	30.4	0.026404	29.2	349.237	1.61E-05	0.02865	0.49545	0.0413	2851.27	699.9	4.008606	
10	723	2311	0.23496	14.02590	35.2	26.7	8.5	30.95	0.026444	30.7	349.553	1.61E-05	0.03089	0.53478	0.04126	2842.18	812.8	3.998813	
11	723	1024	0.08671	5.17640	29.5	26.4	3.1	27.95	0.026225	11.58	347.825	1.58E-05	0.01369	0.23579	0.04147	2892.39	160.8	4.067419	
12	723	1149	0.09512	5.67608	29.7	26.6	3.1	28.15	0.02624	13.9	347.94	1.59E-05	0.01536	0.28466	0.04145	2888.99	202.4	4.062648	
13	723	1364	0.10378	6.19821	29.3	26.6	2.7	27.95	0.026225	19.02	347.825	1.58E-05	0.01923	0.31408	0.04147	2892.39	285.3	4.067419	
14	723	1494	0.11269	6.73690	29.6	26.6	3	28.1	0.026236	20.24	347.911	1.58E-05	0.01997	0.3441	0.04146	2889.84	342.2	4.06384	
15	723	1687	0.12154	7.25550	29.9	26.6	3.3	28.25	0.026247	21.32	347.958	1.59E-05	0.02255	0.38864	0.04145	2887.3	436.1	4.06266	
16	723	1818	0.12995	7.7508	30.2	26.7	3.5	28.45	0.026262	22.97	348.113	1.59E-05	0.0243	0.41896	0.04143	2883.92	508.2	4.055509	
17	723	1967	0.13864	8.27578	30.4	26.7	3.7	28.55	0.026269	24.72	348.171	1.59E-05	0.02629	0.45337	0.04143	2882.23	592.4	4.053134	
18	723	2057	0.14729	8.79259	30.6	26.7	3.9	28.65	0.026276	26.47	348.229	1.59E-05	0.02775	0.47472	0.04142	2880.54	647.7	4.050762	
19	723	2076	0.15662	9.34551	31	26.8	4.2	28.9	0.026295	27.77	348.373	1.59E-05	0.02775	0.47878	0.0414	2876.33	689.3	4.04484	
20	723	2126	0.16459	9.82537	31.4	26.9	4.5	29.15	0.026313	28.6	348.517	1.59E-05	0.02842	0.49051	0.04138	2872.13	691	4.038932	
#		f [Hz]	Vmfc [mV]	VR [V]	VH [V]	TH [C]	TA[C]	deltaT[C]	Tavg [C]	k[W/mK]	Nu	c [m/s]	v [m^2/s]	PR	epsilon	X	N^2	Rs	phi

Ud $\bar{T}$ /T	UVR/VR	UVH/VH	U $\bar{J}$ /K	UNu/NU	UNu	UTavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs
0.2357	0.00027	0.0001	0.00038	0.23591	4.0929	0.02543525	0.00002	3.2E-05	0.0038462	0.0034	0.0074867	0.03125	8.10219
0.1607	0.00027	0.0001	0.00038	0.16102	1.9009	0.02481053	0.00002	3.1E-05	0.0049116	0.0034	0.0074867	0.03134	4.97453
0.1725	0.00026	0.0001	0.00038	0.17275	2.9269	0.02476708	0.00002	3.1E-05	0.0039246	0.0034	0.0074867	0.03075	7.64181
0.1571	0.00026	0.0001	0.00038	0.15745	2.8318	0.02468063	0.00002	3.1E-05	0.003876	0.0034	0.0074867	0.03065	7.80893
0.1386	0.00025	0.0001	0.00038	0.13901	2.7937	0.02442487	0.00002	3.1E-05	0.0034364	0.0034	0.0074867	0.03024	9.79159
0.1263	0.00025	0.0001	0.00038	0.12666	2.9029	0.02421575	0.00002	3.1E-05	0.002809	0.0034	0.0074867	0.02981	14.4366
0.1105	0.00024	0.0001	0.00038	0.11094	2.7478	0.02380508	0.00002	3.1E-05	0.0026682	0.0034	0.0074867	0.02943	15.5452
0.104	0.00024	0.0001	0.00038	0.10447	2.8892	0.023557	0.00002	3.1E-05	0.0024163	0.0034	0.0074867	0.02914	19.0328
0.0933	0.00024	0.0001	0.00038	0.09358	2.7327	0.02325987	0.00002	3.1E-05	0.0023332	0.0034	0.0074867	0.02887	20.2037
0.0832	0.00024	0.0001	0.00038	0.08379	2.5727	0.02284653	0.00002	3.1E-05	0.0021636	0.0034	0.0074867	0.02848	23.1497
0.2281	0.00028	0.0001	0.00038	0.22832	2.6399	0.02529875	0.00002	3.2E-05	0.0048828	0.0034	0.0074867	0.03171	5.09991
0.2281	0.00027	0.0001	0.00038	0.22832	3.1746	0.02511901	0.00002	3.2E-05	0.0045516	0.0034	0.0074867	0.03126	6.32556
0.2619	0.00027	0.0001	0.00038	0.26208	4.9835	0.025259875	0.00002	3.2E-05	0.0036557	0.0034	0.0074867	0.03105	8.65362
0.2357	0.00026	0.0001	0.00038	0.23591	4.7751	0.0251637	0.00002	3.2E-05	0.0033467	0.0034	0.0074867	0.0308	10.5376
0.2143	0.00026	0.0001	0.00038	0.21451	4.5735	0.02503009	0.00002	3.2E-05	0.0029638	0.0034	0.0074867	0.03053	13.3145
0.2022	0.00026	0.0001	0.00038	0.20228	4.6454	0.02485413	0.00002	3.1E-05	0.0027503	0.0034	0.0074867	0.03031	15.3411
0.1911	0.00025	0.0001	0.00038	0.19137	4.7306	0.02476708	0.00002	3.1E-05	0.0025419	0.0034	0.0074867	0.03016	17.8687
0.1813	0.00025	0.0001	0.00038	0.18158	4.8057	0.02468063	0.00002	3.1E-05	0.0024307	0.0034	0.0074867	0.03005	19.4665
0.1684	0.00025	0.0001	0.00038	0.16865	4.6681	0.02446713	0.00002	3.1E-05	0.0024065	0.0034	0.0074867	0.02987	19.395
0.1571	0.00025	0.0001	0.00038	0.15745	4.5034	0.02425729	0.00002	3.1E-05	0.0023518	0.0034	0.0074867	0.02968	20.5109
Ud $\bar{T}$ /T	UVR/VR	UVH/VH	U $\bar{J}$ /K	UNu/NU	UNu	UTavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs

Ud $\bar{T}$ /T	UVR/VR	UVH/VH	U $\bar{J}$ /K	UNu/NU	UNu	UTavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs
0.2357	0.00027	0.0001	0.00038	0.23591	4.0929	0.02543525	0.00002	3.2E-05	0.0038462	0.0034	0.0074867	0.03125	8.10219
0.1607	0.00027	0.0001	0.00038	0.16102	1.9009	0.02481053	0.00002	3.1E-05	0.0049116	0.0034	0.0074867	0.03134	4.97453
0.1725	0.00026	0.0001	0.00038	0.17275	2.9269	0.02476708	0.00002	3.1E-05	0.0039246	0.0034	0.0074867	0.03075	7.64181
0.1571	0.00026	0.0001	0.00038	0.15745	2.8318	0.02468063	0.00002	3.1E-05	0.003876	0.0034	0.0074867	0.03065	7.80893
0.1386	0.00025	0.0001	0.00038	0.13901	2.7937	0.02442487	0.00002	3.1E-05	0.0034364	0.0034	0.0074867	0.03024	9.79159
0.1263	0.00025	0.0001	0.00038	0.12666	2.9029	0.02421575	0.00002	3.1E-05	0.002809	0.0034	0.0074867	0.02981	14.4366
0.1105	0.00024	0.0001	0.00038	0.11094	2.7478	0.02380508	0.00002	3.1E-05	0.0026682	0.0034	0.0074867	0.02943	15.5452
0.104	0.00024	0.0001	0.00038	0.10447	2.8892	0.023557	0.00002	3.1E-05	0.0024163	0.0034	0.0074867	0.02914	19.0328
0.0933	0.00024	0.0001	0.00038	0.09358	2.7327	0.02325987	0.00002	3.1E-05	0.0023332	0.0034	0.0074867	0.02887	20.2037
0.0832	0.00024	0.0001	0.00038	0.08379	2.5727	0.02284653	0.00002	3.1E-05	0.0021636	0.0034	0.0074867	0.02848	23.1497
0.2281	0.00028	0.0001	0.00038	0.22832	2.6399	0.02529875	0.00002	3.2E-05	0.0048828	0.0034	0.0074867	0.03171	5.09991
0.2281	0.00027	0.0001	0.00038	0.22832	3.1746	0.02511901	0.00002	3.2E-05	0.0045516	0.0034	0.0074867	0.03126	6.32556
0.2619	0.00027	0.0001	0.00038	0.26208	4.9835	0.025259875	0.00002	3.2E-05	0.0036557	0.0034	0.0074867	0.03105	8.65362
0.2357	0.00026	0.0001	0.00038	0.23591	4.7751	0.0251637	0.00002	3.2E-05	0.0033467	0.0034	0.0074867	0.0308	10.5376
0.2143	0.00026	0.0001	0.00038	0.21451	4.5735	0.02503009	0.00002	3.2E-05	0.0029638	0.0034	0.0074867	0.03053	13.3145
0.2022	0.00026	0.0001	0.00038	0.20228	4.6454	0.02485413	0.00002	3.1E-05	0.0027503	0.0034	0.0074867	0.03031	15.3411
0.1911	0.00025	0.0001	0.00038	0.19137	4.7306	0.02476708	0.00002	3.1E-05	0.0025419	0.0034	0.0074867	0.03016	17.8687
0.1813	0.00025	0.0001	0.00038	0.18158	4.8057	0.02468063	0.00002	3.1E-05	0.0024307	0.0034	0.0074867	0.03005	19.4665
0.1684	0.00025	0.0001	0.00038	0.16865	4.6681	0.02446713	0.00002	3.1E-05	0.0024065	0.0034	0.0074867	0.02987	19.395
0.1571	0.00025	0.0001	0.00038	0.15745	4.5034	0.02425729	0.00002	3.1E-05	0.0023518	0.0034	0.0074867	0.02968	20.5109
Ud $\bar{T}$ /T	UVR/VR	UVH/VH	U $\bar{J}$ /K	UNu/NU	UNu	UTavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs

Std	1.75																	
	L (m)		0.65000															
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	apsilon	X	N^2	Rs	phi
1	925	862	0.07806	4.65969	29.8	26.4	3.4	28.1	0.026236	8.559	347.911	1.58E-05	0.01152	0.15518	0.05304	3697.24	89.03	5.199242
2	925	586	0.06918	4.12944	29.8	26.5	3.3	28.15	0.02624	6.908	347.94	1.58E-05	0.00783	0.1055	0.05303	3698.15	41.14	5.19777
3	925	950	0.08689	5.17503	30.6	26.8	3.8	28.7	0.02628	9.408	348.258	1.59E-05	0.0127	0.17119	0.05299	3684.26	108	5.180933
4	925	1258	0.09514	5.67945	30.5	26.9	3.6	28.7	0.02628	11.98	348.258	1.59E-05	0.01682	0.22669	0.05299	3684.26	189.3	5.180933
5	925	1413	0.10423	6.22219	30.4	26.7	3.7	28.55	0.026269	13.97	348.171	1.58E-05	0.01889	0.25456	0.053	3687.5	239	5.185545
6	925	1189	0.11288	6.73859	31.4	26.3	5.1	28.85	0.026291	11.88	348.344	1.58E-05	0.01589	0.21431	0.05297	3681.03	169.1	5.176447
7	925	1335	0.12110	7.22873	31.8	26.2	5.6	29	0.026302	12.45	348.431	1.58E-05	0.01785	0.24069	0.05296	3677.8	213.1	5.171908
8	925	1486	0.13014	7.76842	31.7	26.1	5.6	28.9	0.026295	14.38	348.373	1.58E-05	0.01986	0.26787	0.05297	3679.95	264	5.174933
9	925	1552	0.13845	8.26455	31.8	26.2	5.6	29	0.026302	16.27	348.431	1.58E-05	0.02075	0.27991	0.05296	3677.8	288	5.171908
10	925	1691	0.14728	8.79154	32	26.2	5.8	29.1	0.026309	17.77	348.488	1.58E-05	0.0226	0.30492	0.05295	3675.85	341.8	5.188885
11	925	1772	0.15594	9.30856	31.9	26.2	5.7	29.05	0.026305	20.27	348.459	1.58E-05	0.02369	0.3195	0.05296	3676.73	375.3	5.170396
12	925	1695	0.16436	9.81130	32.8	26.3	6.5	29.55	0.026342	19.72	348.748	1.58E-05	0.02266	0.30587	0.05291	3666	343	5.155319
13	925	1850	0.17393	10.39251	32.9	26.3	6.6	29.6	0.026345	21.15	348.776	1.58E-05	0.02473	0.33387	0.05291	3664.94	408.5	5.153816
14	925	1951	0.18257	10.89830	33.2	26.3	6.9	29.75	0.026336	22.91	348.983	1.58E-05	0.02608	0.35218	0.05289	3661.73	454.2	5.149309
15	925	2115	0.19122	11.41470	33.4	26.3	7.1	29.85	0.026364	24.42	348.92	1.58E-05	0.02827	0.38185	0.05289	3659.6	533.8	5.146308
16	925	641	0.09968	5.95010	32.5	26.1	6.4	29.3	0.026324	7.372	348.604	1.58E-05	0.00857	0.11582	0.05293	3671.36	49.08	5.162849
17	925	1020	0.10984	6.48511	31.8	26.1	5.7	28.95	0.026298	9.843	348.402	1.58E-05	0.01363	0.18388	0.05296	3678.88	124.4	5.17342
18	925	1249	0.11630	6.94249	31.8	26.1	5.7	28.95	0.026298	11.28	348.402	1.58E-05	0.0167	0.22516	0.05296	3678.88	186.5	5.17342
19	925	1402	0.12558	7.49626	31.5	26.1	5.4	28.8	0.026287	13.89	348.315	1.58E-05	0.01874	0.25288	0.05298	3682.11	235.1	5.177962
20	925	1795	0.13914	8.30571	30.8	26.2	4.6	28.5	0.026295	20.03	348.142	1.58E-05	0.02399	0.32335	0.053	3688.58	385.7	5.187064
#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi

UdIT/T	UVR/NR	UVH/NH	Uk/k	UuNu	UuNu	Uf/f	Uv/v	UymicVmic	UG/G	U/S/S	URs/URs	URs	
0.208	0.00029	0.0001	0.00038	0.20821	1.7779	0.0251637	0.00002	3.2E-05	0.0058005	0.0034	0.0074867	0.033222	
0.2143	0.0003	0.0001	0.00038	0.21451	1.4819	0.02511901	0.00002	3.2E-05	0.0085824	0.0034	0.0074867	0.03453	
0.1861	0.00028	0.0001	0.00038	0.18635	1.7531	0.02463763	0.00002	3.1E-05	0.0052832	0.0034	0.0074867	0.03144	
0.1964	0.00027	0.0001	0.00038	0.19667	2.3523	0.02463763	0.00002	3.1E-05	0.0039746	0.0034	0.0074867	0.03067	
0.1911	0.00027	0.0001	0.00038	0.19137	2.6742	0.02476708	0.00002	3.1E-05	0.0035386	0.0034	0.0074867	0.03056	
0.1386	0.00026	0.0001	0.00038	0.13901	1.6515	0.02450953	0.00002	3.1E-05	0.0042052	0.0034	0.0074867	0.03069	
0.1263	0.00026	0.0001	0.00038	0.12666	1.5764	0.02438276	0.00002	3.1E-05	0.0037453	0.0034	0.0074867	0.03035	
0.1263	0.00026	0.0001	0.00038	0.12666	1.8211	0.02446713	0.00002	3.1E-05	0.0033647	0.0034	0.0074867	0.03024	
0.1263	0.00025	0.0001	0.00038	0.12666	2.0606	0.02438276	0.00002	3.1E-05	0.0032216	0.0034	0.0074867	0.03011	
0.1219	0.00025	0.0001	0.00038	0.12232	2.1736	0.02429897	0.00002	3.1E-05	0.0029568	0.0034	0.0074867	0.02993	
0.1241	0.00025	0.0001	0.00038	0.12446	2.5231	0.02434079	0.00002	3.1E-05	0.0028217	0.0034	0.0074867	0.02891	
0.1086	0.00025	0.0001	0.00038	0.10924	2.1546	0.02392893	0.00002	3.1E-05	0.0029499	0.0034	0.0074867	0.02963	
0.1071	0.00024	0.0001	0.00038	0.1076	2.3402	0.02388851	0.00002	3.1E-05	0.0027027	0.0034	0.0074867	0.0295	
0.1025	0.00024	0.0001	0.00038	0.10297	2.3591	0.02376807	0.00002	3.1E-05	0.0025628	0.0034	0.0074867	0.02935	
0.0996	0.00024	0.0001	0.00038	0.10009	2.4443	0.02368844	0.00002	3.1E-05	0.0023641	0.0034	0.0074867	0.02922	
0.1105	0.00027	0.0001	0.00038	0.11084	0.8179	0.02413311	0	0.0002	3.1E-05	0.0078003	0.0034	0.0074867	0.03311
0.1241	0.00027	0.0001	0.00038	0.12446	1.225	0.02442467	0.00002	3.1E-05	0.004902	0.0034	0.0074867	0.03103	
0.1241	0.00026	0.0001	0.00038	0.12446	1.4039	0.02442467	0	0.0002	3.1E-05	0.0040032	0.0034	0.0074867	0.03051
0.1309	0.00026	0.0001	0.00038	0.13133	1.8238	0.02455208	0	0.0002	3.1E-05	0.0035663	0.0034	0.0074867	0.0304
0.1537	0.00025	0.0001	0.00038	0.15404	3.0855	0.02481053	0	0.0002	3.1E-05	0.0027855	0.0034	0.0074867	0.03028
UdIT/T	UVR/NR	UVH/NH	Uk/k	UuNu	UuNu	Uf/f	Uv/v	UymicVmic	UG/G	U/S/S	URs/URs	URs	

Std	1.75	L (m)		0.65000		TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	V (m^2/s)	PR	epsilon	X	N^2	Rs	phi	
		#	f (Hz)	Vmfc (mV)	VR (V)	VH (V)														
1	1202	420	0.06998	4.17140	29.8	26	3.8	27.9	0.026222	6.126	347.796	1.59E-05	0.00551	0.05917	0.06895	4810.05	16.27	6.7614		
2	1202	822	0.08761	5.22984	30.3	26	4.3	28.15	0.02624	8.504	347.94	1.59E-05	0.01099	0.11389	0.06892	4803	62.3	6.754223		
3	1202	920	0.09534	5.69152	30.7	26	4.7	28.35	0.026254	9.209	348.056	1.59E-05	0.0123	0.12751	0.06899	4797.37	77.99	6.745307		
4	1202	1009	0.10424	6.22230	31.3	26	5.3	28.85	0.026276	9.753	348.229	1.59E-05	0.01349	0.13991	0.06886	4788.95	93.74	6.734461		
5	1202	1122	0.11243	6.71160	31.7	26	5.6	28.9	0.026285	10.73	348.373	1.59E-05	0.015	0.15564	0.06883	4781.95	115.8	6.724616		
6	1202	1237	0.12134	7.24321	32.2	26	6.2	29.1	0.026309	11.28	348.488	1.59E-05	0.01654	0.17165	0.06881	4776.36	140.7	6.716757		
7	1202	1358	0.12973	7.74438	32.6	26	6.6	29.3	0.026324	12.11	348.604	1.5E-05	0.01815	0.18851	0.06879	4770.78	169.5	6.708913		
8	1202	1471	0.13886	8.28891	33	26	7	29.5	0.026338	13.07	348.719	1.6E-05	0.01986	0.20426	0.06876	4765.21	198.8	6.701084		
9	1202	1525	0.14744	8.80131	33.6	26	7.6	29.8	0.026356	13.56	348.892	1.6E-05	0.02039	0.21186	0.06873	4765.88	213.5	6.689368		
10	1202	1626	0.15622	9.32526	33.8	26	7.8	29.9	0.026367	14.83	348.949	1.6E-05	0.02174	0.22593	0.06872	4754.11	242.7	6.685471		
11	1202	631	0.07351	4.38764	29.7	26	3.7	27.85	0.026218	8.883	347.767	1.59E-05	0.00843	0.08738	0.06895	4811.47	36.74	6.766126		
12	1202	782	0.08215	4.90402	30.2	26	4.2	28.1	0.026236	7.666	347.911	1.59E-05	0.01045	0.10834	0.06892	4804.41	56.39	6.756205		
13	1202	946	0.09034	5.39260	30.8	26.1	4.7	28.45	0.026262	8.268	348.113	1.59E-05	0.01265	0.13113	0.06888	4794.56	82.44	6.742355		
14	1202	1110	0.09822	5.92284	30.9	26	4.9	28.45	0.026262	9.563	348.113	1.59E-05	0.01484	0.15586	0.06888	4794.56	113.5	6.742355		
15	1202	1254	0.10756	6.42054	30.8	25.9	4.9	28.35	0.026254	11.24	348.056	1.59E-05	0.01676	0.1738	0.06889	4797.37	144.9	6.746307		
16	1202	1394	0.11675	6.96998	31.2	25.9	5.3	28.55	0.026269	12.24	348.171	1.59E-05	0.01863	0.19326	0.06887	4791.75	179	6.738406		
17	1202	1530	0.12494	7.45794	31.4	25.9	5.5	28.65	0.026276	13.5	348.229	1.59E-05	0.02045	0.21215	0.06886	4788.95	215.5	6.734461		
18	1202	956	0.09261	5.52835	30.6	26	4.6	28.3	0.026251	8.879	348.027	1.59E-05	0.01278	0.13248	0.06899	4798.78	84.23	6.778285		
19	1202	1090	0.10097	6.02721	31.2	26.1	5.1	28.65	0.026276	9.51	348.229	1.59E-05	0.01457	0.15114	0.06886	4788.95	109.4	6.734461		
20	1202	1276	0.11407	6.80904	31.5	26	5.5	28.75	0.026284	11.25	348.286	1.59E-05	0.01706	0.17696	0.06885	4798.15	149.9	6.73052		
#		f (Hz)	Vmfc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	k(W/mK)	Nu	c (m/s)	V (m^2/s)	PR	epsilon	X	N^2	Rs	phi	

UdT/T	UVR/VR	UVH/VH	Uv/R	Uv/Nu	UNu	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs
0.1861	0.0003	0.0001	0.00038	0.18635	1.1416	0.02534409	0.00002	3.2E-05	0.0119048	0.0034	0.0074867	0.03947	0.62599
0.1644	0.00028	0.0001	0.00038	0.16475	1.401	0.02511901	0.00002	3.2E-05	0.0060827	0.0034	0.0074867	0.03239	2.01602
0.1504	0.00027	0.0001	0.00038	0.15078	1.3886	0.02494118	0.00002	3.2E-05	0.0054348	0.0034	0.0074867	0.03179	2.47955
0.1334	0.00027	0.0001	0.00038	0.13379	1.3049	0.02468063	0.00002	3.1E-05	0.0049554	0.0034	0.0074867	0.03127	2.93134
0.1265	0.00026	0.0001	0.00038	0.12666	1.3563	0.02446713	0.00002	3.1E-05	0.00444563	0.0034	0.0074867	0.0308	3.56773
0.1114	0.00026	0.0001	0.00038	0.11449	1.2918	0.02429897	0.00002	3.1E-05	0.004042	0.0034	0.0074867	0.03043	4.28314
0.1071	0.00026	0.0001	0.00038	0.1076	1.3031	0.02413311	0.00002	3.1E-05	0.0036819	0.0034	0.0074867	0.03012	5.1058
0.1011	0.00025	0.0001	0.00038	0.10151	1.3271	0.02396949	0.00002	3.1E-05	0.003399	0.0034	0.0074867	0.02985	5.93518
0.0933	0.00025	0.0001	0.00038	0.09358	1.2693	0.02372819	0.00002	3.1E-05	0.0032787	0.0034	0.0074867	0.02961	6.32122
0.0907	0.00025	0.0001	0.00038	0.09121	1.3629	0.02364883	0.00002	3.1E-05	0.003075	0.0034	0.0074867	0.02945	7.14771
0.1911	0.00029	0.0001	0.00038	0.19137	1.3324	0.02538959	0.00002	3.2E-05	0.0079239	0.0034	0.0074867	0.03415	1.25427
0.1684	0.00028	0.0001	0.00038	0.16865	1.2913	0.0251637	0.00002	3.2E-05	0.0063939	0.0034	0.0074867	0.03267	1.84204
0.1504	0.00028	0.0001	0.00038	0.15078	1.2463	0.02485413	0.00002	3.1E-05	0.0052854	0.0034	0.0074867	0.03162	2.60701
0.1443	0.00027	0.0001	0.00038	0.14465	1.3834	0.02465413	0.00002	3.1E-05	0.0045045	0.0034	0.0074867	0.03113	3.53956
0.1443	0.00027	0.0001	0.00038	0.14465	1.6261	0.02494118	0.00002	3.2E-05	0.0039872	0.0034	0.0074867	0.03092	4.48067
0.1334	0.00026	0.0001	0.00038	0.13379	1.6375	0.02476708	0.00002	3.1E-05	0.0035863	0.0034	0.0074867	0.03058	5.47356
0.1266	0.00026	0.0001	0.00038	0.12695	1.7411	0.02468063	0.00002	3.1E-05	0.003268	0.0034	0.0074867	0.03037	6.54601
0.1537	0.00027	0.0001	0.00038	0.15404	1.3678	0.02498587	0.00002	3.2E-05	0.0052301	0.0034	0.0074867	0.03169	2.66508
0.1366	0.00027	0.0001	0.00038	0.13901	1.3219	0.02468063	0.00002	3.1E-05	0.0045872	0.0034	0.0074867	0.03104	3.39619
0.1266	0.00026	0.0001	0.00038	0.12895	1.4509	0.02459478	0.00002	3.1E-05	0.0039185	0.0034	0.0074867	0.03061	4.58738
UdT/T	UVR/VR	UVH/VH	Uv/R	Uv/Nu	UNu	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs

UdT/T	UVR/VR	UVH/VH	Uv/R	Uv/Nu	UNu	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs
0.1861	0.0003	0.0001	0.00038	0.18635	1.1416	0.02534409	0.00002	3.2E-05	0.0119048	0.0034	0.0074867	0.03947	0.62599
0.1644	0.00028	0.0001	0.00038	0.16475	1.401	0.02511901	0.00002	3.2E-05	0.0060827	0.0034	0.0074867	0.03239	2.01602
0.1504	0.00027	0.0001	0.00038	0.15078	1.3886	0.02494118	0.00002	3.2E-05	0.0054348	0.0034	0.0074867	0.03179	2.47955
0.1334	0.00027	0.0001	0.00038	0.13379	1.3049	0.02468063	0.00002	3.1E-05	0.0049554	0.0034	0.0074867	0.03127	2.93134
0.1265	0.00026	0.0001	0.00038	0.12666	1.3563	0.02446713	0.00002	3.1E-05	0.00444563	0.0034	0.0074867	0.0308	3.56773
0.1114	0.00026	0.0001	0.00038	0.11449	1.2918	0.02429897	0.00002	3.1E-05	0.004042	0.0034	0.0074867	0.03043	4.28314
0.1071	0.00026	0.0001	0.00038	0.1076	1.3031	0.02413311	0.00002	3.1E-05	0.0036819	0.0034	0.0074867	0.03012	5.1058
0.1011	0.00025	0.0001	0.00038	0.10151	1.3271	0.02396949	0.00002	3.1E-05	0.003399	0.0034	0.0074867	0.02985	5.93518
0.0933	0.00025	0.0001	0.00038	0.09358	1.2693	0.02372819	0.00002	3.1E-05	0.0032787	0.0034	0.0074867	0.02961	6.32122
0.0907	0.00025	0.0001	0.00038	0.09121	1.3629	0.02364883	0.00002	3.1E-05	0.003075	0.0034	0.0074867	0.02945	7.14771
0.1911	0.00029	0.0001	0.00038	0.19137	1.3324	0.02538959	0.00002	3.2E-05	0.0079239	0.0034	0.0074867	0.03415	1.25427
0.1684	0.00028	0.0001	0.00038	0.16865	1.2913	0.0251637	0.00002	3.2E-05	0.0063939	0.0034	0.0074867	0.03267	1.84204
0.1504	0.00028	0.0001	0.00038	0.15078	1.2463	0.02485413	0.00002	3.1E-05	0.0052854	0.0034	0.0074867	0.03162	2.60701
0.1443	0.00027	0.0001	0.00038	0.14465	1.3834	0.02465413	0.00002	3.1E-05	0.0045045	0.0034	0.0074867	0.03113	3.53956
0.1443	0.00027	0.0001	0.00038	0.14465	1.6261	0.02494118	0.00002	3.2E-05	0.0039872	0.0034	0.0074867	0.03092	4.48067
0.1334	0.00026	0.0001	0.00038	0.13379	1.6375	0.02476708	0.00002	3.1E-05	0.0035863	0.0034	0.0074867	0.03058	5.47356
0.1266	0.00026	0.0001	0.00038	0.12695	1.7411	0.02468063	0.00002	3.1E-05	0.003268	0.0034	0.0074867	0.03037	6.54601
0.1537	0.00027	0.0001	0.00038	0.15404	1.3678	0.02498587	0.00002	3.2E-05	0.0052301	0.0034	0.0074867	0.03169	2.66508
0.1366	0.00027	0.0001	0.00038	0.13901	1.3219	0.02468063	0.00002	3.1E-05	0.0045872	0.0034	0.0074867	0.03104	3.39619
0.1266	0.00026	0.0001	0.00038	0.12895	1.4509	0.02459478	0.00002	3.1E-05	0.0039185	0.0034	0.0074867	0.03061	4.58738
UdT/T	UVR/VR	UVH/VH	Uv/R	Uv/Nu	UNu	Uavg/Tavg	Uff	Uv/v	Uvmic/Vmic	UG/G	U/S	URs/RS	URs

Std	0.24000																		
	L (m)	I (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tang (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	R^2	Re	phi
1	383	456	0.13892	8.29374	35.3	24.4	10.9	29.85	0.0265637	8.39833	348.92	1.6E-05	0.0061	0.198934	0.021898	1515.271	59.906	3.798177	
2	383	553	0.14689	8.76981	35.2	24.6	10.6	29.9	0.0265673	9.65228	348.949	1.6E-05	0.0074	0.24115	0.021896	1514.829	88.092	3.787074	
3	383	655	0.15578	9.30000	35.1	24.8	10.3	29.95	0.026371	11.1893	348.978	1.6E-05	0.0088	0.285653	0.021894	1514.388	123.57	3.785971	
4	383	751	0.16487	9.84270	34.7	24.8	9.9	29.75	0.0265564	13.035	348.963	1.6E-05	0.01	0.327412	0.021901	1516.154	162.53	3.790386	
5	383	851	0.17311	10.33480	34.5	24.8	9.7	29.65	0.0263491	14.6584	348.805	1.6E-05	0.0114	0.370947	0.021905	1517.039	208.75	3.792597	
6	383	998	0.18262	10.90250	34.3	24.8	9.5	29.55	0.0263418	16.6511	348.749	1.6E-05	0.0133	0.434952	0.021908	1517.924	287.17	3.794811	
7	383	1033	0.19035	11.36420	34	24.7	9.3	29.35	0.0263273	18.6016	348.632	1.6E-05	0.0141	0.488771	0.021916	1519.697	319.85	3.798243	
8	383	1141	0.19900	11.98050	34.2	24.8	9.4	29.5	0.0263382	19.9975	348.719	1.6E-05	0.0153	0.497234	0.02191	1518.367	376.4	3.799916	
9	383	1253	0.20810	12.42350	34.8	24.9	9.9	29.85	0.0263637	20.7442	348.92	1.6E-05	0.0167	0.546358	0.021898	1515.271	452.32	3.788177	
10	383	1350	0.21608	12.90030	34.9	25	9.9	29.95	0.026371	22.3934	348.978	1.6E-05	0.0118	0.588751	0.021894	1514.388	524.93	3.785971	
11	383	1460	0.22475	13.41790	34.7	24.9	9.8	29.8	0.02636	24.4466	348.992	1.6E-05	0.0195	0.636566	0.021899	1515.713	614.19	3.789282	
12	383	1540	0.23316	13.91980	35.5	25	10.5	30.25	0.0263926	24.552	349.151	1.6E-05	0.0206	0.671945	0.021893	1511.745	682.57	3.779363	
13	383	1648	0.24204	14.45010	35	25	10	30	0.0263746	27.7701	349.007	1.6E-05	0.022	0.7718772	0.021892	1513.947	782.15	3.784868	
14	383	1758	0.25115	14.99400	35	25	10	30	0.0263746	29.9	349.007	1.6E-05	0.0235	0.767478	0.021892	1513.947	890.05	3.784868	
15	383	1840	0.25990	15.51060	35.1	25	10.1	30.05	0.0263782	31.6746	349.035	1.6E-05	0.0246	0.802578	0.02189	1513.506	974.9	3.783766	
16	383	1982	0.26821	16.01260	35	25	10	30	0.0263746	34.1	349.007	1.6E-05	0.0266	0.868806	0.021892	1513.947	1142.8	3.784868	
17	383	2040	0.27598	16.47030	34.9	24.9	10	29.9	0.0263673	36.0876	348.949	1.6E-05	0.0273	0.869595	0.021898	1514.829	1198.8	3.787074	
18	383	2088	0.28601	17.07510	35	25	10	30	0.0263746	38.7759	349.007	1.6E-05	0.0279	0.91077	0.021892	1513.947	1255.6	3.784868	
19	383	2150	0.29598	17.64630	35.3	25	10.3	30.15	0.0263855	40.1907	349.093	1.6E-05	0.0287	0.93795	0.021887	1512.625	1330.7	3.781563	
20	383	2246	0.30249	18.05890	35.8	25	10.8	30.4	0.0264037	40.1168	348.237	1.61E-05	0.03	0.980234	0.021878	1510.426	1451.3	3.776066	
#		I (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tang (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	R^2	Re	phi

UdTT	UVR/NR	UV/H/H	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/f/f	U/v/v	U/mic/mic	U/G/G	U/S/S	U/Rs/Rs	U/Rs
0.0649	0.000253	0.0001	4E-04	0.0656	0.5511	0.0236884	0.00002	3E-05	0.0109849	0.0034	0.0075	0.0362	2.1703
0.0667	0.000251	0.0001	4E-04	0.0675	0.6511	0.0236488	0.00002	3E-05	0.0090416	0.0034	0.0075	0.034	2.9861
0.0687	0.000249	0.0001	4E-04	0.0694	0.7749	0.0236093	0.00002	3E-05	0.0076336	0.0034	0.0075	0.0326	4.0249
0.0714	0.000246	0.0001	4E-04	0.0721	0.9393	0.0237681	0.00002	3E-05	0.0066578	0.0034	0.0075	0.0318	5.1721
0.0729	0.000245	0.0001	4E-04	0.0736	1.0786	0.0238482	0.00002	3E-05	0.0058754	0.0034	0.0075	0.0313	6.5257
0.0744	0.000243	0.0001	4E-04	0.0751	1.2513	0.0239289	0.00002	3E-05	0.00501	0.0034	0.0075	0.0307	8.8205
0.076	0.000242	0.0001	4E-04	0.0767	1.4189	0.024092	0.00002	3E-05	0.0047483	0.0034	0.0075	0.0307	9.812
0.0752	0.00024	0.0001	4E-04	0.0759	1.5176	0.0239695	0.00002	3E-05	0.0043921	0.0034	0.0075	0.0304	11.398
0.0714	0.000239	0.0001	4E-04	0.0721	1.4961	0.0236884	0.00002	3E-05	0.0039904	0.0034	0.0075	0.0289	13.534
0.0714	0.000238	0.0001	4E-04	0.0721	1.6126	0.0236093	0.00002	3E-05	0.0037037	0.0034	0.0075	0.0297	15.596
0.0722	0.000237	0.0001	4E-04	0.0728	1.7808	0.0237282	0.00002	3E-05	0.0034247	0.0034	0.0075	0.0287	18.224
0.0673	0.000236	0.0001	4E-04	0.0681	1.6698	0.0233752	0.00002	3E-05	0.0032468	0.0034	0.0075	0.0283	20.005
0.0707	0.000235	0.0001	4E-04	0.0714	1.9832	0.02357	0.00002	3E-05	0.003034	0.0034	0.0075	0.0284	22.975
0.0707	0.000234	0.0001	4E-04	0.0714	2.1353	0.02357	0.00002	3E-05	0.0028441	0.0034	0.0075	0.0293	26.076
0.07	0.000233	0.0001	4E-04	0.0707	2.2401	0.0235308	0.00002	3E-05	0.0027174	0.0034	0.0075	0.0292	28.484
0.0707	0.000232	0.0001	4E-04	0.0714	2.4953	0.02357	0.00002	3E-05	0.00251	0.0034	0.0075	0.0282	33.34
0.0707	0.000232	0.0001	4E-04	0.0714	2.5772	0.0236488	0.00002	3E-05	0.002451	0.0034	0.0075	0.0292	35.028
0.0707	0.000231	0.0001	4E-04	0.0714	2.7692	0.02357	0.00002	3E-05	0.0023946	0.0034	0.0075	0.0291	36.583
0.0687	0.00023	0.0001	4E-04	0.0694	2.7883	0.0234527	0.00002	3E-05	0.0023256	0.0034	0.0075	0.029	38.817
0.0655	0.00023	0.0001	4E-04	0.0652	2.857	0.0232599	0.00002	3E-05	0.0022262	0.0034	0.0075	0.0288	41.344
UdTT	UVR/NR	UV/H/H	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/f/f	U/v/v	U/mic/mic	U/G/G	U/S/S	U/Rs/Rs	U/Rs

UdTT	UVR/NR	UV/H/H	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/f/f	U/v/v	U/mic/mic	U/G/G	U/S/S	U/Rs/Rs	U/Rs
0.0649	0.000253	0.0001	4E-04	0.0656	0.5511	0.0236884	0.00002	3E-05	0.0109849	0.0034	0.0075	0.0362	2.1703
0.0667	0.000251	0.0001	4E-04	0.0675	0.6511	0.0236488	0.00002	3E-05	0.0090416	0.0034	0.0075	0.034	2.9861
0.0687	0.000249	0.0001	4E-04	0.0694	0.7749	0.0236093	0.00002	3E-05	0.0076336	0.0034	0.0075	0.0326	4.0249
0.0714	0.000246	0.0001	4E-04	0.0721	0.9393	0.0237681	0.00002	3E-05	0.0066578	0.0034	0.0075	0.0318	5.1721
0.0729	0.000245	0.0001	4E-04	0.0736	1.0786	0.0238482	0.00002	3E-05	0.0058754	0.0034	0.0075	0.0313	6.5257
0.0744	0.000243	0.0001	4E-04	0.0751	1.2513	0.0239289	0.00002	3E-05	0.00501	0.0034	0.0075	0.0307	8.8205
0.076	0.000242	0.0001	4E-04	0.0767	1.4189	0.024092	0.00002	3E-05	0.0047483	0.0034	0.0075	0.0307	9.812
0.0752	0.00024	0.0001	4E-04	0.0759	1.5176	0.0239695	0.00002	3E-05	0.0043921	0.0034	0.0075	0.0304	11.398
0.0714	0.000239	0.0001	4E-04	0.0721	1.4961	0.0236884	0.00002	3E-05	0.0039904	0.0034	0.0075	0.0289	13.534
0.0714	0.000238	0.0001	4E-04	0.0721	1.6126	0.0236093	0.00002	3E-05	0.0037037	0.0034	0.0075	0.0297	15.596
0.0722	0.000237	0.0001	4E-04	0.0728	1.7808	0.0237282	0.00002	3E-05	0.0034247	0.0034	0.0075	0.0287	18.224
0.0673	0.000236	0.0001	4E-04	0.0681	1.6698	0.0233752	0.00002	3E-05	0.0032468	0.0034	0.0075	0.0283	20.005
0.0707	0.000235	0.0001	4E-04	0.0714	1.9832	0.02357	0.00002	3E-05	0.003034	0.0034	0.0075	0.0284	22.975
0.0707	0.000234	0.0001	4E-04	0.0714	2.1353	0.02357	0.00002	3E-05	0.0028441	0.0034	0.0075	0.0293	26.076
0.07	0.000233	0.0001	4E-04	0.0707	2.2401	0.0235308	0.00002	3E-05	0.0027174	0.0034	0.0075	0.0292	28.484
0.0707	0.000232	0.0001	4E-04	0.0714	2.4953	0.02357	0.00002	3E-05	0.00251	0.0034	0.0075	0.0282	33.34
0.0707	0.000232	0.0001	4E-04	0.0714	2.5772	0.0236488	0.00002	3E-05	0.002451	0.0034	0.0075	0.0292	35.028
0.0707	0.000231	0.0001	4E-04	0.0714	2.7692	0.02357	0.00002	3E-05	0.0023946	0.0034	0.0075	0.0291	36.583
0.0687	0.00023	0.0001	4E-04	0.0694	2.7883	0.0234527	0.00002	3E-05	0.0023256	0.0034	0.0075	0.029	38.817
0.0655	0.00023	0.0001	4E-04	0.0652	2.857	0.0232599	0.00002	3E-05	0.0022262	0.0034	0.0075	0.0288	41.344
UdTT	UVR/NR	UV/H/H	Uk/k	UNu/Nu	UNu	UTavg/Tavg	U/f/f	U/v/v	U/mic/mic	U/G/G	U/S/S	U/Rs/Rs	U/Rs

Std	2		L (m)		0.65													
	#	f (Hz)	Vnlc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tang (C)	K(W/mmK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs
1	676	711	0.10334	5.16724	28.8	24	4.8	26.4	0.0261121	10.6488	346.928	1.57E-05	0.0095	0.174647	0.038871	2729.155	83.244	6.822887
2	676	971	0.12031	7.17984	29.2	24.2	5	26.7	0.0261341	13.843	347.102	1.57E-05	0.013	0.238832	0.038852	2724.327	165.14	6.810617
3	676	1057	0.13839	8.25858	29.7	24.2	5.5	26.95	0.0261523	16.6395	347.247	1.57E-05	0.0141	0.258875	0.038836	2720.314	183.42	6.800786
4	676	1096	0.15763	9.40695	31.3	24.4	6.9	27.85	0.0262118	17.765	347.767	1.58E-05	0.0147	0.269868	0.038778	2705.95	197.07	6.764875
5	676	1214	0.17213	10.27210	32.1	24.6	7.5	28.35	0.0262544	18.8643	348.056	1.59E-05	0.0162	0.299171	0.038746	2698.024	241.48	6.74506
6	676	1361	0.18951	11.30960	32.7	25	7.7	28.85	0.0262909	22.1718	348.344	1.59E-05	0.0182	0.335675	0.038713	2690.136	303.12	6.725339
7	676	1615	0.20760	12.38890	32.7	24.8	7.9	28.75	0.0262836	25.9392	348.286	1.59E-05	0.0216	0.398255	0.03872	2691.71	428.92	6.729276
8	676	1924	0.223365	13.34720	32.7	24.8	7.9	28.75	0.0262836	30.1073	348.286	1.59E-05	0.0257	0.474453	0.03872	2691.71	605.92	6.729276
9	676	2040	0.24063	14.35970	33.6	24.9	8.7	29.25	0.02632	31.6001	348.575	1.6E-05	0.0273	0.503475	0.038888	2683.852	680.32	6.709631
10	676	2148	0.25806	15.40030	35.1	25	10.1	30.05	0.0262782	31.2388	349.035	1.6E-05	0.0287	0.530383	0.038637	2671.358	752.74	6.678396
11	676	2348	0.25806	15.40030	34.6	25	9.6	29.8	0.02636	32.8885	348.892	1.6E-05	0.0314	0.380017	0.038853	2675.252	900.01	6.688132
12	676	882	0.10357	6.18089	29	24.8	4.2	26.9	0.0262487	12.2061	347.218	1.57E-05	0.0115	0.211915	0.038839	2721.116	122.2	6.802791
13	676	1071	0.12051	7.19182	29	25.1	3.9	27.05	0.0261596	17.7704	347.304	1.57E-05	0.0143	0.263361	0.038829	2718.712	188.57	6.776781
14	676	1323	0.13851	8.26587	29.6	25.1	4.5	27.35	0.0261815	20.304	347.478	1.58E-05	0.0177	0.32591	0.038881	2713.915	287.52	6.784787
15	676	1422	0.15608	9.31402	30.2	25.1	5.1	27.65	0.0262034	22.7798	347.651	1.58E-05	0.019	0.350022	0.038891	2709.131	331.91	6.772829
16	676	1889	0.17278	10.31110	29.8	25.1	4.7	27.45	0.0261888	30.3109	347.536	1.58E-05	0.0252	0.464572	0.038803	2712.319	685.39	6.760787
17	676	1368	0.16364	9.76535	31	25.1	5.9	28.05	0.0262326	21.6215	347.982	1.58E-05	0.0183	0.336954	0.038765	2702.775	306.87	6.769338
18	676	1446	0.15873	9.47239	31	25.2	5.8	28.1	0.0262362	20.6915	347.911	1.58E-05	0.0193	0.356196	0.038762	2701.982	342.82	6.754956
19	676	1668	0.17326	10.33929	30.6	25.2	5.4	27.9	0.0262216	26.93	347.796	1.58E-05	0.0223	0.410745	0.038774	2705.156	456.39	6.728899
20	676	1921	0.18183	10.85036	30.5	25.2	5.3	27.85	0.026218	29.7342	347.767	1.58E-05	0.0257	0.473007	0.038778	2705.95	605.42	6.764875
#	f (Hz)	Vnlc (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tang (C)	K(W/mmK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi

UdT/T	UVR/NR	UVH/VH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1473	0.000268	0.0001	4E-04	0.1477	1.5723	0.0267841	0.00002	3E-05	0.0070323	0.0034	0.0075	0.0344	2.8663
0.1414	0.00026	0.0001	4E-04	0.1418	1.9626	0.0264831	0.00002	3E-05	0.0051493	0.0034	0.0075	0.0328	5.0333
0.1286	0.000253	0.0001	4E-04	0.129	2.1457	0.0262375	0.00002	3E-05	0.0047304	0.0034	0.0075	0.0324	5.9484
0.1025	0.000248	0.0001	4E-04	0.103	1.7674	0.0253895	0.00002	3E-05	0.004562	0.0034	0.0075	0.0316	6.2267
0.0943	0.000245	0.0001	4E-04	0.0948	1.7828	0.0249418	0.00002	3E-05	0.0041186	0.0034	0.0075	0.031	7.4836
0.0918	0.000242	0.0001	4E-04	0.0924	2.0481	0.0245095	0.00002	3E-05	0.0036738	0.0034	0.0075	0.0304	9.2187
0.0895	0.000239	0.0001	4E-04	0.0901	2.3362	0.0245948	0.00002	3E-05	0.0030956	0.0034	0.0075	0.0302	12.905
0.0895	0.000237	0.0001	4E-04	0.0901	2.7116	0.0245948	0.00002	3E-05	0.0025988	0.0034	0.0075	0.03	18.201
0.0813	0.000235	0.0001	4E-04	0.0819	2.5878	0.0241744	0.00002	3E-05	0.002451	0.0034	0.0075	0.0295	20.169
0.07	0.000233	0.0001	4E-04	0.0707	2.2993	0.0235308	0.00002	3E-05	0.0023277	0.0034	0.0075	0.0291	21.892
0.0737	0.000233	0.0001	4E-04	0.0743	2.4447	0.0237282	0.00002	3E-05	0.0021295	0.0034	0.0075	0.0292	26.284
0.1684	0.000268	0.0001	4E-04	0.1687	2.0586	0.0262282	0.00002	3E-05	0.0058005	0.0034	0.0075	0.0331	4.0465
0.1813	0.00026	0.0001	4E-04	0.1816	3.2304	0.0261405	0.00002	3E-05	0.0046685	0.0034	0.0075	0.0323	6.0839
0.1571	0.000253	0.0001	4E-04	0.1575	3.2042	0.0256537	0.00002	3E-05	0.0037733	0.0034	0.0075	0.0316	9.0741
0.1386	0.000248	0.0001	4E-04	0.139	3.1666	0.0255732	0.00002	3E-05	0.0035162	0.0034	0.0075	0.0312	10.358
0.1504	0.000245	0.0001	4E-04	0.1508	4.5703	0.0257596	0.00002	3E-05	0.0026483	0.0034	0.0075	0.031	18.167
0.1198	0.000247	0.0001	4E-04	0.1203	2.6003	0.0252086	0.00002	3E-05	0.003655	0.0034	0.0075	0.031	9.51047
0.1219	0.000248	0.0001	4E-04	0.1223	2.5311	0.0251637	0.00002	3E-05	0.0034578	0.0034	0.0075	0.0308	10.575
0.1309	0.000245	0.0001	4E-04	0.1313	3.4792	0.0253441	0.00002	3E-05	0.0029976	0.0034	0.0075	0.0308	14.057
0.1334	0.000243	0.0001	4E-04	0.1338	3.9782	0.0253895	0.00002	3E-05	0.0026028	0.0034	0.0075	0.0307	18.563
UdT/T	UVR/NR	UVH/VH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

UdT/T	UVR/NR	UVH/VH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs
0.1473	0.000268	0.0001	4E-04	0.1477	1.5723	0.0267841	0.00002	3E-05	0.0070323	0.0034	0.0075	0.0344	2.8663
0.1414	0.00026	0.0001	4E-04	0.1418	1.9626	0.0264831	0.00002	3E-05	0.0051493	0.0034	0.0075	0.0328	5.0333
0.1286	0.000253	0.0001	4E-04	0.129	2.1457	0.0262375	0.00002	3E-05	0.0047304	0.0034	0.0075	0.0324	5.9484
0.1025	0.000248	0.0001	4E-04	0.103	1.7674	0.0253895	0.00002	3E-05	0.004562	0.0034	0.0075	0.0316	6.2267
0.0943	0.000245	0.0001	4E-04	0.0948	1.7828	0.0249418	0.00002	3E-05	0.0041186	0.0034	0.0075	0.031	7.4836
0.0918	0.000242	0.0001	4E-04	0.0924	2.0481	0.0245095	0.00002	3E-05	0.0036738	0.0034	0.0075	0.0304	9.2187
0.0895	0.000239	0.0001	4E-04	0.0901	2.3362	0.0245948	0.00002	3E-05	0.0030956	0.0034	0.0075	0.0302	12.905
0.0895	0.000237	0.0001	4E-04	0.0901	2.7116	0.0245948	0.00002	3E-05	0.0025988	0.0034	0.0075	0.03	18.201
0.0813	0.000235	0.0001	4E-04	0.0819	2.5878	0.0241744	0.00002	3E-05	0.002451	0.0034	0.0075	0.0295	20.169
0.07	0.000233	0.0001	4E-04	0.0707	2.2993	0.0235308	0.00002	3E-05	0.0023277	0.0034	0.0075	0.0291	21.892
0.0737	0.000233	0.0001	4E-04	0.0743	2.4447	0.0237282	0.00002	3E-05	0.0021295	0.0034	0.0075	0.0292	26.284
0.1684	0.000268	0.0001	4E-04	0.1687	2.0586	0.0262282	0.00002	3E-05	0.0058005	0.0034	0.0075	0.0331	4.0465
0.1813	0.00026	0.0001	4E-04	0.1816	3.2304	0.0261405	0.00002	3E-05	0.0046685	0.0034	0.0075	0.0323	6.0839
0.1571	0.000253	0.0001	4E-04	0.1575	3.2042	0.0256537	0.00002	3E-05	0.0037733	0.0034	0.0075	0.0316	9.0741
0.1386	0.000248	0.0001	4E-04	0.139	3.1666	0.0255732	0.00002	3E-05	0.0035162	0.0034	0.0075	0.0312	10.358
0.1504	0.000245	0.0001	4E-04	0.1508	4.5703	0.0257596	0.00002	3E-05	0.0026483	0.0034	0.0075	0.031	18.167
0.1198	0.000247	0.0001	4E-04	0.1203	2.6003	0.0252086	0.00002	3E-05	0.003655	0.0034	0.0075	0.031	9.51047
0.1219	0.000248	0.0001	4E-04	0.1223	2.5311	0.0251637	0.00002	3E-05	0.0034578	0.0034	0.0075	0.0308	10.575
0.1309	0.000245	0.0001	4E-04	0.1313	3.4792	0.0253441	0.00002	3E-05	0.0029976	0.0034	0.0075	0.0308	14.057
0.1334	0.000243	0.0001	4E-04	0.1338	3.9782	0.0253895	0.00002	3E-05	0.0026028	0.0034	0.0075	0.0307	18.563
UdT/T	UVR/NR	UVH/VH	Uk/k	UNu/NU	UNu	UTavg/Tavg	Uiff	Uv/v	Uvmic/Vmic	UG/G	US/S	URs/RS	URs

Sud	2	L (m)		0.60000																
		#	f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R*	phi
		1	723	1000	0.10364	6.18548	25.1	22.2	2.9	23.65	0.025911	17.8656	345.332	1.54E-05	0.0134	0.228611	0.041766	2866.947	155.06	7.417358
		2	723	1243	0.12092	7.21676	25.9	22.4	3.5	24.15	0.0259476	20.1122	345.623	1.55E-05	0.0166	0.284403	0.041731	2958.115	239.27	7.395288
		3	723	1520	0.13169	8.21780	26.1	22.4	3.7	24.25	0.0259549	24.6741	345.681	1.55E-05	0.0203	0.34784	0.041724	2956.354	357.7	7.390885
		4	723	1654	0.15603	9.31248	27.2	22.7	4.5	24.95	0.0260061	26.0012	346.088	1.56E-05	0.0221	0.37985	0.041675	2944.074	422.78	7.380186
		5	723	1768	0.17211	10.27234	28.8	23.5	5.3	26.15	0.0260939	26.7717	346.783	1.57E-05	0.0236	0.405983	0.041591	2933.218	481.57	7.398045
		6	723	1957	0.18948	11.30500	29.3	23.7	5.6	26.5	0.0261195	30.6794	346.986	1.57E-05	0.0262	0.449335	0.041567	2917.181	589.51	7.292952
		7	723	2026	0.20689	12.34790	30.4	23.7	6.7	27.05	0.0261596	30.5333	347.304	1.57E-05	0.0271	0.465931	0.041529	2907.735	630.92	7.289338
		8	723	2092	0.22383	13.34720	31.6	23.8	7.8	27.7	0.026207	30.5787	347.68	1.58E-05	0.028	0.481506	0.041484	2896.637	671.58	7.241592
		9	723	2334	0.24128	14.40030	31.9	24	7.9	27.95	0.02625253	35.1194	347.825	1.58E-05	0.0312	0.53743	0.041467	2892.387	835.41	7.230987
		10	723	2483	0.25802	15.39930	33.1	24	9.1	28.55	0.0262659	34.8071	348.171	1.59E-05	0.0332	0.572308	0.041426	2882.229	944.03	7.205572
		11	723	800	0.11111	6.56713	30.2	24	6.2	27.1	0.0261633	9.81691	347.333	1.58E-05	0.0107	0.183949	0.041526	2906.879	98.36	7.267197
		12	723	982	0.12911	7.70582	30.8	24.2	6.6	27.5	0.0261925	12.0023	347.565	1.58E-05	0.0131	0.225947	0.041498	2900.044	148.05	7.250111
		13	723	1282	0.14611	8.72031	30.5	24.3	6.2	27.4	0.0261852	16.4349	347.507	1.58E-05	0.0167	0.288024	0.041505	2801.75	240.72	7.254376
		14	723	1435	0.16417	9.79841	29.8	24.3	5.5	27.05	0.0261596	23.4136	347.304	1.57E-05	0.0192	0.329931	0.041529	2907.735	316.52	7.299338
		15	723	1675	0.18113	10.81040	31.1	24.3	6.8	27.7	0.026207	23.0095	347.68	1.58E-05	0.0224	0.385227	0.041484	2896.637	430.53	7.241592
		16	723	1703	0.19763	11.79506	32.3	24.1	8.2	28.2	0.0262435	22.6838	347.969	1.59E-05	0.0228	0.392298	0.041445	2888.147	444.48	7.220388
		17	723	1849	0.21572	12.87484	33.1	24.3	8.8	28.7	0.0262799	25.1594	348.258	1.59E-05	0.0247	0.426283	0.041415	2879.698	523.29	7.199246
		18	723	1974	0.23247	13.87493	33.8	24.3	9.5	29.05	0.0263054	27.0294	348.459	1.59E-05	0.0264	0.455665	0.041391	2873.808	595.91	7.184521
		19	723	2119	0.24853	14.83312	34.3	24.5	9.8	29.4	0.0263309	29.8174	348.661	1.6E-05	0.0283	0.489997	0.041367	2867.938	686.06	7.159846
		20	723	2160	0.25915	15.46712	35.1	24.6	10.5	29.85	0.0263637	30.3232	348.92	1.6E-05	0.0289	0.498931	0.041337	2860.42	712.05	7.15105
#			f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	R*	phi

UT/UT	UVR/VR	UVH/VH	UJK	UNU/Nu	UNU	UTavg/Tavg	Uff	Uvv	Uvnu	Uvnu/Avnic	UG/G	US/S	URs/RS	URs
0.2436	0.000266	0.0001	4E-04	0.244	4.3598	0.0298966	0.00002	3E-05	0.005	0.0034	0.0075	0.0366	5.5137	
0.202	0.00026	0.0001	4E-04	0.2023	4.0702	0.0292795	0.00002	3E-05	0.0040225	0.0034	0.0075	0.0345	8.2824	
0.1911	0.000254	0.0001	4E-04	0.1914	4.7219	0.0291588	0.00002	3E-05	0.0032895	0.0034	0.0075	0.0341	12.204	
0.1571	0.000248	0.0001	4E-04	0.1575	4.0939	0.0283407	0.00002	3E-05	0.003023	0.0034	0.0075	0.0333	14.087	
0.1334	0.000245	0.0001	4E-04	0.1338	3.5818	0.0270402	0.00002	3E-05	0.0028281	0.0034	0.0075	0.0321	15.482	
0.1263	0.000242	0.0001	4E-04	0.1267	3.886	0.0266883	0.00002	3E-05	0.0025549	0.0034	0.0075	0.0318	18.721	
0.1055	0.000239	0.0001	4E-04	0.106	3.2358	0.0261405	0.00002	3E-05	0.0024679	0.0034	0.0075	0.0313	19.732	
0.0907	0.000237	0.0001	4E-04	0.0912	2.7889	0.0255271	0.00002	3E-05	0.0023901	0.0034	0.0075	0.0307	20.644	
0.0895	0.000235	0.0001	4E-04	0.0901	3.163	0.0252987	0.00002	3E-05	0.0021422	0.0034	0.0075	0.0305	25.461	
0.0777	0.000233	0.0001	4E-04	0.0783	2.727	0.0247671	0.00002	3E-05	0.0020137	0.0034	0.0075	0.03	28.322	
0.114	0.000264	0.0001	4E-04	0.1145	1.1008	0.0260923	0.00002	3E-05	0.00625	0.0034	0.0075	0.0333	3.2734	
0.1071	0.000256	0.0001	4E-04	0.1076	1.2369	0.0257127	0.00002	3E-05	0.005916	0.0034	0.0075	0.0322	4.7638	
0.1114	0.000251	0.0001	4E-04	0.1145	1.8816	0.0256066	0.00002	3E-05	0.0039936	0.0034	0.0075	0.0316	7.6131	
0.1286	0.000247	0.0001	4E-04	0.129	3.0193	0.0261405	0.00002	3E-05	0.0034843	0.0034	0.0075	0.0317	10.021	
0.104	0.000243	0.0001	4E-04	0.1045	2.4037	0.0255271	0.00002	3E-05	0.0029851	0.0034	0.0075	0.0309	13.324	
0.0862	0.00024	0.0001	4E-04	0.0868	1.9692	0.0250745	0.00002	3E-05	0.002936	0.0034	0.0075	0.0306	13.581	
0.0804	0.000238	0.0001	4E-04	0.081	2.0365	0.0246376	0.00002	3E-05	0.0027042	0.0034	0.0075	0.0301	15.757	
0.0744	0.000236	0.0001	4E-04	0.0751	2.03	0.0243408	0.00002	3E-05	0.0025329	0.0034	0.0075	0.0298	17.763	
0.0722	0.000234	0.0001	4E-04	0.0728	2.1793	0.024051	0.00002	3E-05	0.0023566	0.0034	0.0075	0.0295	20.249	
0.0673	0.000233	0.0001	4E-04	0.0681	2.0645	0.0236884	0.00002	3E-05	0.0023148	0.0034	0.0075	0.0292	20.797	
उत्तर	UVR/VR	UVH/VH	UJK	UNU/NU	UNU	UTavg/Tavg	Uff	Uvv	Uvnu	Uvnu/Avnic	UG/G	US/S	URs/RS	URs

UT/UT	UVR/VR	UVH/VH	UJK	UNU/Nu	UNU	UTavg/Tavg	Uff	Uvv	Uvnu	Uvnu/Avnic	UG/G	US/S	URs/RS	URs
0.2436	0.000266	0.0001	4E-04	0.244	4.3598	0.0298966	0.00002	3E-05	0.005	0.0034	0.0075	0.0366	5.5137	
0.202	0.00026	0.0001	4E-04	0.2023	4.0702	0.0292795	0.00002	3E-05	0.0040225	0.0034	0.0075	0.0345	8.2824	
0.1911	0.000254	0.0001	4E-04	0.1914	4.7219	0.0291588	0.00002	3E-05	0.0032895	0.0034	0.0075	0.0341	12.204	
0.1571	0.000248	0.0001	4E-04	0.1575	4.0939	0.0283407	0.00002	3E-05	0.003023	0.0034	0.0075	0.0333	14.087	
0.1334	0.000245	0.0001	4E-04	0.1338	3.5818	0.0270402	0.00002	3E-05	0.0028281	0.0034	0.0075	0.0321	15.482	
0.1263	0.000242	0.0001	4E-04	0.1267	3.886	0.0266883	0.00002	3E-05	0.0025549	0.0034	0.0075	0.0318	18.721	
0.1055	0.000239	0.0001	4E-04	0.106	3.2358	0.0261405	0.00002	3E-05	0.0024679	0.0034	0.0075	0.0313	19.732	
0.0907	0.000237	0.0001	4E-04	0.0912	2.7889	0.0255271	0.00002	3E-05	0.0023901	0.0034	0.0075	0.0307	20.644	
0.0895	0.000235	0.0001	4E-04	0.0901	3.163	0.0252987	0.00002	3E-05	0.0021422	0.0034	0.0075	0.0305	25.461	
0.0777	0.000233	0.0001	4E-04	0.0783	2.727	0.0247671	0.00002	3E-05	0.0020137	0.0034	0.0075	0.03	28.322	
0.114	0.000264	0.0001	4E-04	0.1145	1.1008	0.0260923	0.00002	3E-05	0.00625	0.0034	0.0075	0.0333	3.2734	
0.1071	0.000256	0.0001	4E-04	0.1076	1.2369	0.0257127	0.00002	3E-05	0.005916	0.0034	0.0075	0.0322	4.7638	
0.1114	0.000251	0.0001	4E-04	0.1145	1.8816	0.0256066	0.00002	3E-05	0.0039936	0.0034	0.0075	0.0316	7.6131	
0.1286	0.000247	0.0001	4E-04	0.129	3.0193	0.0261405	0.00002	3E-05	0.0034843	0.0034	0.0075	0.0317	10.021	
0.104	0.000243	0.0001	4E-04	0.1045	2.4037	0.0255271	0.00002	3E-05	0.0029851	0.0034	0.0075	0.0309	13.324	
0.0862	0.00024	0.0001	4E-04	0.0868	1.9692	0.0250745	0.00002	3E-05	0.002936	0.0034	0.0075	0.0306	13.581	
0.0804	0.000238	0.0001	4E-04	0.081	2.0365	0.0246376	0.00002	3E-05	0.0027042	0.0034	0.0075	0.0301	15.757	
0.0744	0.000236	0.0001	4E-04	0.0751	2.03	0.0243408	0.00002	3E-05	0.0025329	0.0034	0.0075	0.0298	17.763	
0.0722	0.000234	0.0001	4E-04	0.0728	2.1793	0.024051	0.00002	3E-05	0.0023566	0.0034	0.0075	0.0295	20.249	
0.0673	0.000233	0.0001	4E-04	0.0681	2.0645	0.0236884	0.00002	3E-05	0.0023148	0.0034	0.0075	0.0292	20.797	
उत्तर	UVR/VR	UVH/VH	UJK	UNU/NU	UNU	UTavg/Tavg	Uff	Uvv	Uvnu	Uvnu/Avnic	UG/G	US/S	URs/RS	URs

Std 2	L (m)		0.65000																
	#	f (Hz)	Vm1c (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(N/mK)	Nu	C (m/s)	V(m^2/s)	PR	epsilon	X	N^2	Rs	phi
1	925	1123	0.10310	6.15347	27.5	24.1	3.5	25.95	0.026072	14.5598	346.61	1.59E-05	0.015	0.201408	0.053238	3746.581	151.98	9.358454	
2	925	1384	0.12052	7.19309	28.5	24.3	4.2	26.4	0.026121	16.5535	346.928	1.57E-05	0.0182	0.244956	0.053189	3734.42	221.9	9.336051	
3	925	1577	0.13795	8.23313	29	24.4	4.6	26.7	0.0261341	18.7841	347.102	1.57E-05	0.0211	0.283234	0.053163	3727.814	288.05	9.319535	
4	925	1697	0.15467	9.23136	29.8	24.6	5.2	27.2	0.026706	21.9718	347.391	1.58E-05	0.0227	0.305041	0.053119	3716.847	345.85	9.292117	
5	925	1770	0.17207	10.26994	31.1	24.6	6.5	27.85	0.026218	21.7757	347.767	1.58E-05	0.0237	0.318207	0.053081	3702.688	375.62	9.256671	
6	925	1802	0.18902	11.28152	31.8	24.6	7.2	28.2	0.0262435	23.6337	347.969	1.59E-05	0.0254	0.342559	0.05303	3695.071	433.35	9.237677	
7	925	1953	0.20620	12.30850	33.2	24.6	8.6	28.9	0.0262945	23.4894	348.373	1.59E-05	0.0261	0.352049	0.052869	3679.952	458.09	9.199881	
8	925	2150	0.22452	13.40040	33.7	24.7	9	29.2	0.0263164	26.6022	348.546	1.59E-05	0.0287	0.387753	0.052943	3673.504	552.32	9.183761	
9	925	970	0.09406	5.61365	29.1	25	4.1	27.05	0.0261596	10.3092	347.304	1.57E-05	0.013	0.174317	0.053132	3720.131	113.04	9.300329	
10	925	856	0.08592	5.12814	28.7	25	3.7	26.85	0.026145	9.5385	347.189	1.57E-05	0.0114	0.153779	0.05315	3724.518	88.077	9.311286	
11	925	1340	0.11172	6.66807	29	25.1	3.9	27.05	0.0261596	16.2817	347.304	1.57E-05	0.0179	0.240809	0.053132	3720.131	215.73	9.300329	
12	925	1405	0.12889	7.69236	30.3	25.3	5	27.8	0.0262143	16.8402	347.738	1.58E-05	0.0188	0.252805	0.053066	3703.756	236.71	9.25939	
13	925	1668	0.14610	8.71958	30.6	25.2	5.4	27.9	0.0262216	18.8408	347.796	1.58E-05	0.0223	0.300177	0.053057	3701.581	333.54	9.253954	
14	925	1720	0.16282	9.71190	31.3	25.4	5.9	26.35	0.0262544	21.3915	348.056	1.59E-05	0.023	0.309766	0.0530177	3691.822	354.26	9.229566	
15	925	1799	0.17233	10.28507	32	25.4	6.6	28.7	0.0262799	21.3982	348.258	1.59E-05	0.024	0.324182	0.052966	3684.261	387.19	9.210654	
16	925	1929	0.18158	10.83731	32.5	25.5	7	29	0.0263018	22.3926	348.431	1.59E-05	0.0256	0.347781	0.05296	3677.801	444.84	9.194593	
17	925	1976	0.18973	11.32370	32.7	25.5	7.2	29.1	0.0263091	23.7514	348.488	1.59E-05	0.0264	0.356313	0.052951	3675.651	466.66	9.198129	
18	925	2203	0.21596	12.88940	33.6	25.6	8	29.6	0.0263455	27.658	348.776	1.6E-05	0.0294	0.39775	0.052908	3664.935	575.3	9.162339	
19	925	2052	0.20645	12.32190	33.8	25.9	7.9	29.85	0.0263637	26.5784	348.92	1.6E-05	0.0274	0.370476	0.052886	3659.597	502.29	9.148992	
20	925	1894	0.19041	11.36410	34.5	25.7	8.8	30.1	0.0263819	18.5178	349.064	1.6E-05	0.0253	0.342092	0.052864	3654.271	427.65	9.135618	
#		f (Hz)	Vm1c (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	Tavg (C)	K(N/mK)	Nu	C (m/s)	V(m^2/s)	PR	epsilon	X	N^2	Rs	phi

UTavg/Tavg	Uff	Uvv	UvmicA/mic	UG/G	US/S	URs/Rs	URs
0.027334	0.00002	3E-05	0.0044624	0.0034	0.0075	0.0331	5.036
0.0267841	0.00002	3E-05	0.0036657	0.0034	0.0075	0.0323	7.2259
0.0264831	0.00002	3E-05	0.0031706	0.0034	0.0075	0.0318	9.5135
0.0259963	0.00002	3E-05	0.0029464	0.0034	0.0075	0.0313	10.832
0.025386	0.00002	3E-05	0.0028249	0.0034	0.0075	0.0308	11.559
0.0250745	0.00002	3E-05	0.0026288	0.0034	0.0075	0.0304	13.193
0.0244671	0.00002	3E-05	0.0025602	0.0034	0.0075	0.0299	13.647
0.0242158	0.00002	3E-05	0.0023256	0.0034	0.0075	0.0296	16.37
0.0261405	0.00002	3E-05	0.0051546	0.0034	0.0075	0.0326	3.6804
0.0263352	0.00002	3E-05	0.0058411	0.0034	0.0075	0.0332	2.9218
0.0261405	0.00002	3E-05	0.0037313	0.0034	0.0075	0.0318	6.8541
0.0254353	0.00002	3E-05	0.0035587	0.0034	0.0075	0.0311	7.3646
0.0253441	0.00002	3E-05	0.00298976	0.0034	0.0075	0.0308	10.273
0.0249448	0.00002	3E-05	0.0029307	0.0034	0.0075	0.0304	10.782
0.0246376	0.00002	3E-05	0.0027793	0.0034	0.0075	0.0301	11.67
0.0243828	0.00002	3E-05	0.0025592	0.0034	0.0075	0.0299	13.284
0.0242299	0.00002	3E-05	0.0025304	0.0034	0.0075	0.0298	13.894
0.0236885	0.00002	3E-05	0.0022656	0.0034	0.0075	0.0294	17.005
0.0236884	0.00002	3E-05	0.0024386	0.0034	0.0075	0.0292	14.69
0.0234947	0.00002	3E-05	0.0026399	0.0034	0.0075	0.0292	12.469
UTavg/Tavg	Uff	Uvv	UvmicA/mic	UG/G	US/S	URs/Rs	URs

Ud/T/T	UVR/VR	UVH/VH	Uk/k	UNUN/u	UNU
0.202	0.000268	0.0001	4E-04	0.2023	2.9451
0.1684	0.00026	0.0001	4E-04	0.1687	2.7918
0.1537	0.000253	0.0001	4E-04	0.154	3.0476
0.136	0.000249	0.0001	4E-04	0.1363	2.9958
0.1088	0.000245	0.0001	4E-04	0.1092	2.3723
0.0982	0.000242	0.0001	4E-04	0.0987	2.3331
0.0822	0.000239	0.0001	4E-04	0.0828	1.9464
0.0786	0.000237	0.0001	4E-04	0.0792	2.107
0.1725	0.000274	0.0001	4E-04	0.1728	1.781
0.1911	0.00028	0.0001	4E-04	0.1914	1.8234
0.1813	0.000284	0.0001	4E-04	0.1816	2.7767
0.1414	0.000257	0.0001	4E-04	0.1418	2.2457
0.1309	0.000251	0.0001	4E-04	0.1313	2.4743
0.1198	0.000247	0.0001	4E-04	0.1203	2.5727
0.1071	0.000245	0.0001	4E-04	0.1076	2.3026
0.101	0.000243	0.0001	4E-04	0.1015	2.2721
0.0982	0.000242	0.0001	4E-04	0.0987	2.3447
0.0884	0.000238	0.0001	4E-04	0.089	2.4603
0.0895	0.000239	0.0001	4E-04	0.0901	2.3037
0.0804	0.000242	0.0001	4E-04	0.081	1.5804
Ud/T/T	UVR/VR	UVH/VH	Uk/k	UNUN/u	UNU

Std	2	L (m)										0.65000									
		f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	Ta(C)	deltaT(C)	Tang (C)	k(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Ra	phi		
1	1202	1162	0.10288	6.14012	28.8	24.8	4	28.8	0.0261414	12.6808	347.16	1.57E-05	0.0155	0.180331	0.089071	4841.287	124.92	12.10322			
2	1202	1290	0.11157	6.65879	29.1	24.9	4.2	27	0.026156	14.1619	347.275	1.57E-05	0.0172	0.178985	0.069048	4835.584	153.87	12.09896			
3	1202	1455	0.12019	7.17328	29.4	25	4.4	27.2	0.0261706	15.6791	347.391	1.58E-05	0.0194	0.201269	0.069025	4829.891	195.65	12.07473			
4	1202	1532	0.12894	7.69549	29.7	25	4.7	27.35	0.0261815	16.8862	347.478	1.58E-05	0.0205	0.21173	0.069008	4825.629	216.83	12.06407			
5	1202	1633	0.13738	8.19945	30.2	25	5.2	27.6	0.0261997	17.3149	347.622	1.58E-05	0.0218	0.226042	0.068988	4818.54	246.2	12.04635			
6	1202	1703	0.14604	8.71593	30.6	25	5.6	27.8	0.0262143	18.18173	347.738	1.58E-05	0.0228	0.235809	0.068957	4812.88	267.63	12.0322			
7	1202	896	0.08630	5.15068	28.5	24.7	3.8	26.6	0.0261268	9.37886	347.044	1.57E-05	0.012	0.123819	0.069094	4847.002	74.31	12.11751			
8	1202	731	0.07727	4.61156	27.8	24.8	3	26.3	0.0261048	9.52806	346.87	1.57E-05	0.0098	0.100967	0.069129	4835.594	49.499	12.13899			
9	1202	1209	0.09468	5.64993	28.2	24.9	3.3	26.55	0.0261231	12.9927	347.015	1.57E-05	0.0162	0.167059	0.0691	4848.432	135.31	12.12108			
10	1202	1414	0.11209	6.68965	28.9	24.7	4.2	26.8	0.0261414	14.3915	347.16	1.57E-05	0.0189	0.195467	0.069071	4841.287	184.97	12.10322			
11	1202	1467	0.12022	7.17515	29.4	24.8	4.6	27.1	0.0261633	15.0894	347.333	1.58E-05	0.0196	0.202895	0.069037	4832.736	198.95	12.08164			
12	1202	1635	0.12903	7.70113	29.4	24.9	4.5	27.15	0.0261669	17.6724	347.362	1.58E-05	0.0219	0.226149	0.069031	4831.313	247.09	12.07828			
13	1202	1843	0.13745	8.20358	29.4	24.9	4.5	27.15	0.0261669	20.0036	347.362	1.58E-05	0.0246	0.254919	0.069031	4831.313	313.86	12.07828			
14	1202	1377	0.13745	8.20352	31.3	25.1	6.2	28.2	0.0262435	14.6524	347.969	1.59E-05	0.0184	0.190796	0.068911	4801.594	174.79	12.00399			
15	1202	1209	0.12877	7.68528	31.6	24.8	6.8	28.2	0.0262435	11.6129	347.969	1.59E-05	0.0162	0.167518	0.068911	4801.594	134.74	12.00399			
16	1202	1049	0.12110	7.22751	31.7	24.7	7	28.2	0.0262435	9.9772	347.969	1.59E-05	0.014	0.145348	0.068911	4801.594	101.44	12.00399			
17	1202	895	0.11159	6.66036	31.4	24.7	6.7	28.05	0.0262326	8.85586	347.882	1.58E-05	0.0118	0.122394	0.068938	4805.822	72.228	12.0455			
18	1202	625	0.10287	6.14551	30.7	24.7	6	27.7	0.026207	8.42748	347.68	1.58E-05	0.0084	0.086528	0.068968	4815.709	36.055	12.03927			
19	1202	1240	0.11544	6.88965	30.2	24.8	5.4	27.5	0.0261925	11.7754	347.565	1.58E-05	0.0166	0.171614	0.068991	4821.373	142	12.05333			
20	1202	1392	0.13304	7.94011	30.7	24.9	5.8	27.8	0.0262143	14.5491	347.738	1.58E-05	0.0186	0.19246	0.068957	4812.88	178.8	12.0322			

Ud/T	UVR/VR	UVH/VH	Uv/k	UNu/NU	UNu	UTavg/Tavg	U/f	Uv/v	Uvnic/Amic	UG/G	US/S	URs/RS	URs
0.1768	0.0002668	0.0001	4E-04	0.1771	2.2999	0.0263843	0.00002	3E-05	0.0043629	0.0034	0.0075	0.0323	4.0397
0.1684	0.000264	0.0001	4E-04	0.1687	2.3985	0.0261889	0.00002	3E-05	0.003876	0.0034	0.0075	0.0319	4.9057
0.1607	0.00026	0.0001	4E-04	0.161	2.5246	0.0259983	0.00002	3E-05	0.0034364	0.0034	0.0075	0.0315	6.167
0.1504	0.000257	0.0001	4E-04	0.1508	2.5461	0.0258537	0.00002	3E-05	0.0032637	0.0034	0.0075	0.0313	6.7929
0.136	0.000254	0.0001	4E-04	0.1363	2.3609	0.0256196	0.00002	3E-05	0.0030618	0.0034	0.0075	0.0311	7.6454
0.1263	0.000251	0.0001	4E-04	0.1267	2.2999	0.0254353	0.00002	3E-05	0.0028936	0.0034	0.0075	0.0309	8.2569
0.1861	0.000248	0.0001	4E-04	0.1863	1.7472	0.02525827	0.00002	3E-05	0.0025804	0.0034	0.0075	0.0332	2.4664
0.2357	0.0002488	0.0001	4E-04	0.2359	2.2478	0.0268889	0.00002	3E-05	0.0068839	0.0034	0.0075	0.0344	1.7007
0.2143	0.000273	0.0001	4E-04	0.2145	2.787	0.0265328	0.00002	3E-05	0.0041356	0.0034	0.0075	0.0324	4.3108
0.1684	0.000264	0.0001	4E-04	0.1687	2.4142	0.0263843	0.00002	3E-05	0.0035361	0.0034	0.0075	0.0319	5.8977
0.1537	0.00026	0.0001	4E-04	0.154	2.3121	0.0260923	0.00002	3E-05	0.0034083	0.0034	0.0075	0.0316	6.284
0.1571	0.000256	0.0001	4E-04	0.1575	2.7826	0.0260442	0.00002	3E-05	0.0030561	0.0034	0.0075	0.0314	7.7594
0.1571	0.000254	0.0001	4E-04	0.1575	3.1575	0.0260442	0.00002	3E-05	0.0027113	0.0034	0.0075	0.0313	9.8193
0.114	0.000254	0.0001	4E-04	0.1145	1.6815	0.0250745	0.00002	3E-05	0.0036311	0.0034	0.0075	0.0309	5.3229
0.104	0.000257	0.0001	4E-04	0.1045	1.2132	0.0250745	0.00002	3E-05	0.0041356	0.0034	0.0075	0.0311	4.1913
0.101	0.00026	0.0001	4E-04	0.1015	1.0128	0.0250745	0.00002	3E-05	0.0047664	0.0034	0.0075	0.0315	3.1918
0.1055	0.000264	0.0001	4E-04	0.106	0.9388	0.0252086	0.00002	3E-05	0.0056497	0.0034	0.0075	0.0321	2.3221
0.1179	0.000268	0.0001	4E-04	0.1183	0.9968	0.0255271	0.00002	3E-05	0.0068	0.0034	0.0075	0.0343	1.2375
0.1309	0.000262	0.0001	4E-04	0.1313	1.5464	0.0257127	0.00002	3E-05	0.0040323	0.0034	0.0075	0.0316	4.4827
0.1219	0.000255	0.0001	4E-04	0.1223	1.7797	0.0254353	0.00002	3E-05	0.003552	0.0034	0.0075	0.0311	5.566
Ud/T	UVR/VR	UVH/VH	Uv/k	UNu/NU	UNu	UTavg/Tavg	U/f	Uv/v	Uvnic/Amic	UG/G	US/S	URs/RS	URs

Ud/T	UVR/VR	UVH/VH	Uv/k	UNu/NU	UNu
0.1768	0.0002668	0.0001	4E-04	0.1771	2.2999
0.1684	0.000264	0.0001	4E-04	0.1687	2.3985
0.1607	0.00026	0.0001	4E-04	0.161	2.5246
0.1504	0.000257	0.0001	4E-04	0.1508	2.5461
0.136	0.000254	0.0001	4E-04	0.1363	2.3609
0.1263	0.000251	0.0001	4E-04	0.1267	2.2999
0.1861	0.000248	0.0001	4E-04	0.1863	1.7472
0.2357	0.0002488	0.0001	4E-04	0.2359	2.2478
0.2143	0.000273	0.0001	4E-04	0.2145	2.787
0.1684	0.000264	0.0001	4E-04	0.1687	2.4142
0.1537	0.00026	0.0001	4E-04	0.154	2.3121
0.1571	0.000256	0.0001	4E-04	0.1575	2.7826
0.1571	0.000254	0.0001	4E-04	0.1575	3.1575
0.114	0.000254	0.0001	4E-04	0.1145	1.6815
0.104	0.000257	0.0001	4E-04	0.1045	1.2132
0.101	0.00026	0.0001	4E-04	0.1015	1.0128
0.1055	0.000264	0.0001	4E-04	0.106	0.9388
0.1179	0.000268	0.0001	4E-04	0.1183	0.9968
0.1309	0.000262	0.0001	4E-04	0.1313	1.5464
0.1219	0.000255	0.0001	4E-04	0.1223	1.7797

S/N	2	L (m)		0.65000		K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Ra	phi				
		f (Hz)	Vmic (mV)	VR (V)	VH (V)														
1	1461	597	0.06907	4.12209	27.2	24.7	2.5	25.95	0.0260793	9.1443	346.668	1.56E-05	0.008	0.067301	0.084074	5914.073	27.187	14.78518	
2	1461	948	0.08578	5.11959	28.3	25	3.3	26.65	0.0261304	10.665	347.073	1.57E-05	0.0127	0.10779	0.083976	5899.668	68.43	14.72417	
3	1461	1013	0.10287	6.14534	28.9	25.3	4.6	27.6	0.0261997	10.9848	347.622	1.58E-05	0.0135	0.115363	0.083843	5856.811	77.946	14.64203	
4	1461	1109	0.11178	6.67151	30.7	25.2	5.5	27.95	0.0262253	10.8272	347.825	1.58E-05	0.0148	0.126369	0.083794	5844.782	93.336	14.61195	
5	1461	1283	0.12015	7.17058	30.8	25.5	5.3	28.15	0.0262399	12.9739	347.94	1.59E-05	0.0173	0.147384	0.083766	5837.926	126.81	14.59482	
6	1461	506	0.07291	4.35139	28.5	25.5	3	27	0.026156	8.46872	347.275	1.57E-05	0.0068	0.057567	0.083927	5877.527	19.476	14.69392	
7	1461	651	0.08149	4.86391	29.1	25.7	3.4	27.4	0.0261852	9.32389	347.507	1.58E-05	0.0087	0.074113	0.083871	5883.703	32.208	14.65926	
8	1461	827	0.08995	5.36244	29.5	25.7	3.8	27.6	0.0261997	10.1443	347.622	1.58E-05	0.0111	0.094181	0.083843	5855.811	51.95	14.64203	
9	1461	840	0.09459	5.64554	30.1	25.7	4.4	27.9	0.0262216	9.69281	347.796	1.58E-05	0.0112	0.095709	0.083801	5846.497	53.555	14.61624	
10	1461	884	0.09899	5.90238	30.5	25.7	4.8	28.1	0.0262362	9.70551	347.911	1.58E-05	0.0118	0.100756	0.083773	5839.639	69.282	14.5991	
11	1461	1017	0.11581	6.91176	31.9	25.8	6.1	28.85	0.0262909	10.4519	348.344	1.59E-05	0.0136	0.116059	0.083869	5814.036	78.313	14.55909	
12	1461	1121	0.12642	7.54502	32.7	25.8	6.9	29.25	0.02632	10.9886	348.575	1.6E-05	0.0115	0.128012	0.083614	5800.456	85.052	14.50114	
13	1461	1242	0.13305	7.94086	33.3	25.7	7.6	29.5	0.0263382	11.0532	348.719	1.6E-05	0.0166	0.141888	0.083579	5791.995	116.61	14.47999	
14	1461	1290	0.13735	8.19759	33.6	25.9	7.7	29.75	0.0263564	11.6384	348.863	1.6E-05	0.0172	0.147432	0.083545	5783.555	125.71	14.45889	
15	1461	795	0.07855	4.68841	28.2	25.4	2.8	26.8	0.0261414	10.537	347.16	1.57E-05	0.0101	0.08598	0.083955	5884.46	43.502	14.77115	
16	1461	1082	0.09492	5.65942	29	25.4	3.6	27.2	0.0261706	11.9283	347.391	1.58E-05	0.0142	0.120863	0.083899	5870.608	85.768	14.67652	
17	1461	996	0.10229	6.10531	29.9	25.4	4.5	27.65	0.0262034	11.0917	347.651	1.58E-05	0.0133	0.113436	0.083836	5855.09	76.342	14.63773	
18	1461	1142	0.11654	6.95545	31	25.4	5.6	28.2	0.0262435	11.5503	347.969	1.59E-05	0.0153	0.130183	0.083759	5836.214	88.91	14.59054	
19	1461	1104	0.12382	7.39018	32.3	25.6	6.7	28.95	0.0262982	10.8758	348.402	1.59E-05	0.0148	0.126008	0.083655	5810.636	92.261	14.56559	
20	1461	1198	0.13606	8.12083	32.9	25.5	7.4	29.2	0.0263164	11.8821	348.546	1.59E-05	0.016	0.136793	0.083621	5892.151	108.57	14.50538	
#		f (Hz)	Vmic (mV)	VR (V)	VH (V)	TH (C)	TA(C)	deltaT(C)	tavg (C)	K(W/mK)	Nu	c (m/s)	v (m^2/s)	PR	epsilon	X	N^2	Rs	phi

UdT/T	UVR/VR	UVH/VH	UJK	UNu/Nu	UNu	UTavg/Tavg	Ufff	Uvv	Uvmic/Amic	UG/G	US/S	URs/Rs	URs
0.2828	0.000297	0.0001	4E-04	0.283	2.588	0.0272486	0.00002	3E-05	0.0083752	0.0034	0.0075	0.036	0.9778
0.2143	0.00028	0.0001	4E-04	0.2145	2.2877	0.0265328	0.00002	3E-05	0.0052743	0.0034	0.0075	0.033	2.2548
0.1537	0.000263	0.0001	4E-04	0.154	1.6837	0.0256196	0.00002	3E-05	0.0049358	0.0034	0.0075	0.032	2.4946
0.1266	0.000264	0.0001	4E-04	0.129	1.3862	0.0252987	0.00002	3E-05	0.0045086	0.0034	0.0075	0.0315	2.9394
0.1334	0.00026	0.0001	4E-04	0.1336	1.7358	0.0251119	0.00002	3E-05	0.0038667	0.0034	0.0075	0.031	3.9316
0.2357	0.000292	0.0001	4E-04	0.2359	1.9874	0.0261889	0.00002	3E-05	0.0098814	0.0034	0.0075	0.0367	0.7148
0.2098	0.000284	0.0001	4E-04	0.2082	1.9413	0.0258066	0.00002	3E-05	0.0076805	0.0034	0.0075	0.0342	1.1028
0.1861	0.000277	0.0001	4E-04	0.1863	1.8885	0.0256196	0.00002	3E-05	0.0060459	0.0034	0.0075	0.0328	1.7017
0.1607	0.000273	0.0001	4E-04	0.161	1.5607	0.0253441	0.00002	3E-05	0.0059524	0.0034	0.0075	0.0325	1.7391
0.1473	0.000271	0.0001	4E-04	0.1477	1.4332	0.0251637	0.00002	3E-05	0.0056561	0.0034	0.0075	0.0321	1.9041
0.1159	0.000262	0.0001	4E-04	0.1164	1.2161	0.0245095	0.00002	3E-05	0.0049164	0.0034	0.0075	0.0311	2.4363
0.1026	0.000257	0.0001	4E-04	0.103	1.1325	0.0241744	0.00002	3E-05	0.0044603	0.0034	0.0075	0.0306	2.9056
0.093	0.000255	0.0001	4E-04	0.0936	1.0343	0.0239685	0.00002	3E-05	0.0040258	0.0034	0.0075	0.0302	3.5172
0.0918	0.000254	0.0001	4E-04	0.0924	1.0733	0.0237681	0.00002	3E-05	0.003876	0.0034	0.0075	0.0289	3.7619
0.2525	0.000286	0.0001	4E-04	0.2527	2.6631	0.0263843	0.00002	3E-05	0.0066138	0.0034	0.0075	0.0338	1.4698
0.1984	0.000273	0.0001	4E-04	0.1967	2.346	0.0259983	0.00002	3E-05	0.0047081	0.0034	0.0075	0.0322	2.7588
0.1571	0.000269	0.0001	4E-04	0.1575	1.7764	0.0255732	0.00002	3E-05	0.0050201	0.0034	0.0075	0.032	2.4124
0.1263	0.000261	0.0001	4E-04	0.1267	1.463	0.0260745	0.00002	3E-05	0.0043783	0.0034	0.0075	0.0312	3.0898
0.1055	0.000258	0.0001	4E-04	0.106	1.153	0.0244249	0.00002	3E-05	0.0045529	0.0034	0.0075	0.0308	2.8423
0.0956	0.000254	0.0001	4E-04	0.0961	1.1416	0.0242158	0.00002	3E-05	0.0041736	0.0034	0.0075	0.0304	3.3048
UdT/T	UVR/VR	UVH/VH	UJK	UNu/Nu	UNu	UTavg/Tavg	Ufff	Uvv	Uvmic/Amic	UG/G	US/S	URs/Rs	URs

UdT/T	UVR/VR	UVH/VH	UJK	UNu/Nu	UNu	UTavg/Tavg	Ufff	Uvv	Uvmic/Amic	UG/G	US/S	URs/Rs	URs
0.2828	0.000297	0.0001	4E-04	0.283	2.588	0.0272486	0.00002	3E-05	0.0083752	0.0034	0.0075	0.036	0.9778
0.2143	0.00028	0.0001	4E-04	0.2145	2.2877	0.0265328	0.00002	3E-05	0.0052743	0.0034	0.0075	0.033	2.2548
0.1537	0.000263	0.0001	4E-04	0.154	1.6837	0.0256196	0.00002	3E-05	0.0049358	0.0034	0.0075	0.032	2.4946
0.1266	0.000264	0.0001	4E-04	0.129	1.3862	0.0252987	0.00002	3E-05	0.0045086	0.0034	0.0075	0.0315	2.9394
0.1334	0.00026	0.0001	4E-04	0.1336	1.7358	0.0251119	0.00002	3E-05	0.0038667	0.0034	0.0075	0.031	3.9316
0.2357	0.000292	0.0001	4E-04	0.2359	1.9874	0.0261889	0.00002	3E-05	0.0098814	0.0034	0.0075	0.0367	0.7148
0.2098	0.000284	0.0001	4E-04	0.2082	1.9413	0.0258066	0.00002	3E-05	0.0076805	0.0034	0.0075	0.0342	1.1028
0.1861	0.000277	0.0001	4E-04	0.1863	1.8885	0.0256196	0.00002	3E-05	0.0060459	0.0034	0.0075	0.0328	1.7017
0.1607	0.000273	0.0001	4E-04	0.161	1.5607	0.0253441	0.00002	3E-05	0.0059524	0.0034	0.0075	0.0325	1.7391
0.1473	0.000271	0.0001	4E-04	0.1477	1.4332	0.0251637	0.00002	3E-05	0.0056561	0.0034	0.0075	0.0321	1.9041
0.1159	0.000262	0.0001	4E-04	0.1164	1.2161	0.0245095	0.00002	3E-05	0.0049164	0.0034	0.0075	0.0311	2.4363
0.1026	0.000257	0.0001	4E-04	0.103	1.1325	0.0241744	0.00002	3E-05	0.0044603	0.0034	0.0075	0.0306	2.9056
0.093	0.000255	0.0001	4E-04	0.0936	1.0343	0.0239685	0.00002	3E-05	0.0040258	0.0034	0.0075	0.0302	3.5172
0.0918	0.000254	0.0001	4E-04	0.0924	1.0733	0.0237681	0.00002	3E-05	0.003876	0.0034	0.0075	0.0289	3.7619
0.2525	0.000286	0.0001	4E-04	0.2527	2.6631	0.0263843	0.00002	3E-05	0.0066138	0.0034	0.0075	0.0338	1.4698
0.1984	0.000273	0.0001	4E-04	0.1967	2.346	0.0259983	0.00002	3E-05	0.0047081	0.0034	0.0075	0.0322	2.7588
0.1571	0.000269	0.0001	4E-04	0.1575	1.7764	0.0255732	0.00002	3E-05	0.0050201	0.0034	0.0075	0.032	2.4124
0.1263	0.000261	0.0001	4E-04	0.1267	1.463	0.0260745	0.00002	3E-05	0.0043783	0.0034	0.0075	0.0312	3.0898
0.1055	0.000258	0.0001	4E-04	0.106	1.153	0.0244249	0.00002	3E-05	0.0045529	0.0034	0.0075	0.0308	2.8423
0.0956	0.000254	0.0001	4E-04	0.0961	1.1416	0.0242158	0.00002	3E-05	0.0041736	0.0034	0.0075	0.0304	3.3048
UdT/T	UVR/VR	UVH/VH	UJK	UNu/Nu	UNu	UTavg/Tavg	Ufff	Uvv	Uvmic/Amic	UG/G	US/S	URs/Rs	URs

**THIS PAGE INTENTIONALLY LEFT BLANK**

## LIST OF REFERENCES

Atchley, A. A., Hofler, T. J., Muzzeral, M. D., Kite, C., Acoustically generated temperature gradients in short plates, *J. Acoust. Soc. Am.* 88 (1), pp. 251-263, 1990.

Beckwith, T. G., Marangoni, R. D., Lienhard, J. H., *Mechanical Measurements*, Fifth Edition, pp. 82-84, 1993.

Davidson, B. J., Heat transfer from a vibrating circular cylinder, *Int. J. Heat Transfer* 16, pp. 1703-1727, 1973.

Garrett, S. L., and Hofler, T. J., Thermoacoustic refrigeration, *ASHRAE Journal* 34 (12) pp. 28-36, 1992.

Garrett, S. L., Perkins, D. K., Gopinath, A., Thermoacoustic refrigerator heat exchangers: design, analysis and fabrication, in: *Tenth International Heat Transfer Conference*, Brighton, UK, pp.375-380, 1994.

Gopinath, A., Harder, D. R., An experimental study of heat transfer from a cylinder in low-amplitude zero-mean oscillatory flows, *Int. J. Heat Mass Trans.* 43, pp. 505-520, 1999.

Hall, P., On the stability of the unsteady boundary layer on a cylinder oscillating transversely in a viscous fluid, *J. Fluid Mech.* 146, pp. 347-367, 1984.

Lighthill, M. J., "Introduction. Real and Ideal Fluids", *Laminar Boundary Layers*, pp. 1-45, Clarendon Press, Oxford, 1963.

Mozurkewich, G., Heat transfer from a cylinder in an acoustic standing wave, *J. Acoust. Soc. Am.* 98 (4), pp. 2209-2216, 1995.

Nyborg, W. L., Acoustic streaming, in W. Mason (Ed.), *Physical Acoustics*, vol. IIB, Academic Press, New York, pp. 266-331, 1965.

Raney, W. P., Corelli, J. C., Westervelt, P. J., Acoustical streaming in the vicinity of a cylinder, *J. Acoust. Soc. Am.* 26 (6), pp. 1006-1014, 1954.

Richardson, P. D., Effects of sound and vibration on heat transfer, *Appl. Mech. Reviews* 20, pp. 201-217, 1967.

Richardson, P. D., Heat Transfer from a circular cylinder by acoustic streaming, *J. Fluid Mech.*, pp. 337-355, 1967.

Riley, N., Oscillating viscous flows, *Mathematika* 12 (24), pp. 161-175, 1965.

Riley, N., On a sphere oscillating in a viscous fluid., Quart. J. Mech, Appl. Math. 19 (4), pp. 461-472, 1966.

Sarpkaya, T., Force on a circular cylinder in viscous oscillatory flow at low Keulegan-Carpenter numbers, J. Fluid Mech. 165, pp. 61-71, 1986.

Stuart, J. T., Double boundary layers in oscillatory viscous flows, J. Fluid Mech. 24, pp. 673-687, 1966.

Swift, G. W., "Thermoacoustic engines and refrigerators", Physics Today, pp. 22-28, 1995.

Westervelt, P. J., Effect of sound waves on heat transfer, J. Acous. Soc. Am. 32 (3), pp. 337-338, 1960.

Wheately, J., Hofler, T., Swift, G.W., Migliori, A., An intrinsically irreversible thermoacoustic heat engine, J Acoust. Soc. Am. 74 (1), pp. 153-170, 1983.

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center.....2  
8725 John J. Kingman Rd., STE 0944  
Ft. Belvoir, Virginia 22060-6218
2. Dudley Knox Library.....2  
Naval Postgraduate School  
411 Dyer Rd.  
Monterey, California 93943-5101
3. Mechanical Engineering Curriculum.....1  
Code 34  
Naval Postgraduate School  
700 Dyer Rd.  
Monterey, California 93943-5107
4. Prof. Ashok Gopinath.....2  
Department of Mechanical Engineering  
Naval Postgraduate School  
Monterey, California 93943-5002
5. ENS Gabriel Lowe.....1  
P.O. Box 1072  
Tijeras, New Mexico 87059